

IFP

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Issue 66 • June 2016

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JUNE 2016 • ISSUE 66

Cover image: Facade systems: do the simplest routes to compliance lead to the safest solutions?
Image courtesy of Kingspan Insulation.

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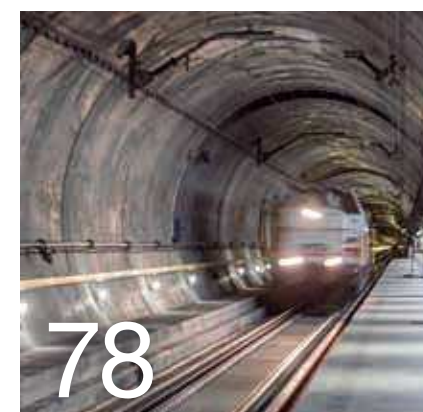
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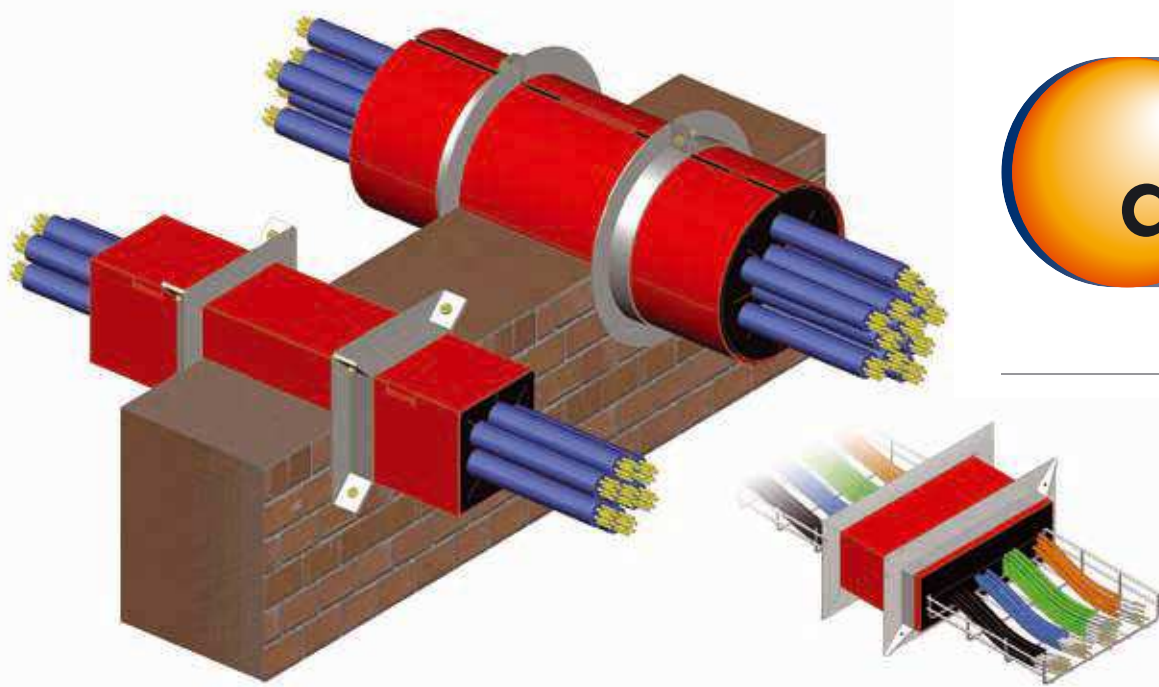
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Cable Transit Systems

- Tested to BS EN 1366-3
- Designed for single or multiple cables
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Even a 'small,' fire lasting a short period of time can pose a significant threat to personnel in the vicinity. Moreover, the affects of fire, smoke and water damage on business interruption, even for a relatively short time can be disastrous.

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Used worldwide in hundreds of complex environments, Fireclamp® Cable Transit devices are tested and approved by independent third party laboratories such as Underwriters Laboratories, UL. Fireclamp® Cable Transits are easy to install and require minimal maintenance.

When it comes to business critical fire sealing of cables - in data processing centres, banking and finance buildings, TV and media studios, apartment buildings, hotels, office complexes, hospitals, airports, retail centres, etc - rely on the proven solution - Abesco Fireclamp® Cable Transits.

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A passive revolution? Revolutionary change for the passive fire protection industry

I was recently invited to be a guest speaker at an industry conference, and as part of the process I was asked to write a short biography to accompany the programme. From this I learnt a valuable lesson – read your biography out loud before sending it! Why? Because on the day of the conference, the Chairman introduced me by saying, 'Wilf has over forty years of experience within the fire protection industry'!



Wilf Butcher

CEO of the Association for Specialist Fire Protection

On hearing these words my first thoughts were, how is this possible? Where has the time gone? I still feel like I'm in my thirties, well forties, ok fifties!

For those considerably younger than I, four decades must seem like an eternity, but those of a similar age will be only too well aware of just how quickly the decades roll by.

In reality, a great deal has changed within the last forty years. The world wide web; mobile communication and all of the benefits that computerisation and social media now offer us, were the stuff of science fiction back in the 1970s when I started my working life.

From a fire industry perspective, technology has revolutionised the way we can design buildings. It offers a wealth of opportunities, with the use of innovative new materials and fire engineered solutions, that prescriptive design from back in the day could never emulate.

My own field of expertise, passive fire

protection has, it might be argued, witnessed little real change over the last forty years. Many of the passive fire protection solutions seen today protecting our new and innovative iconic buildings, are little more than an improved variation of the products and systems marketed some forty years ago. Evolution rather than revolution you might say.

The Association for Specialist Fire Protection (ASFP) was also formed just over forty years ago for no other reason than to improve overall standards in passive fire protection and develop good practice for all those involved in the design, build, inspection and management of the built environment. For a good many of the last four decades this has been an uphill struggle, with passive fire protection often disregarded, and seen as the fire protection element that is generally 'out of sight' and 'out of mind'.

Events over the last two or three years have however seen a sharp change in this mind-set. Passive fire protection has come to the forefront of consideration, particularly brought to light by the legacy issues identified in a number of high profile PFI building investigations, and major fires where ineffective installation of the required protection measures have proved that they have not been fit for purpose.

Often this has not been the fault of the originally installed fire protective measure, but a culmination of issues brought about by one, or a number, of follow on trades over the years, who with little or no knowledge of fire compartmentation, have opened up the compartment to pass through their own services, leaving the damaged fire barrier vulnerable to smoke and fire penetration. Apathy, ignorance and denial has been the

order of the day, but there is now something of a revolution underway, the likes of which has not been seen over most of the last forty years.

To significantly improve the appropriate specification and installation of passive fire protection, many organisations – be they Tier One contractors, institutional bodies or those who manage major building portfolios – are now insisting on a minimum level of product and installer competency, demonstrated through appropriate third party certification. Furthermore, others are now ensuring that all follow on trades can demonstrate that they are not just competent in their own field of expertise, but can also demonstrate the appropriate skill-sets necessary to reinstate the fire protective compartments they breach.

If there is a revolution in the passive fire protection sector, it is one of a thirst for knowledge and a recognition that competency of installation is essential. The ASFP is now at the forefront of this revolution, offering a wealth of guidance, codes of practice and best practice guides through its website www.asfp.org.uk, along with a range of videos and developing training initiatives, to assist and support all those who need to specify, install, inspect or manage passive fire protection systems.

It might have taken the best part of forty years to get to this point but it is worth remembering that whilst new technologies may come and go, we should take note of the American naturalist, poet and philosopher, Henry David Thoreau (1817-1862) who said 'things do not change, we do'!

 For more information go to www.asfp.org.uk

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Big data, global data Why it's critical to evaluate fire data from around the world

Without accurate fire data, governments and safety advocates are unable to justify the need for fire prevention, public education, and code enforcement capabilities. The headlines from around the world are becoming all too frequent: “Massive New Year’s Eve fire erupts at luxury Dubai hotel”; “23 Killed in Russian mental clinic fire”; “Workers trapped in garment factory fire in Bangladesh”; “Hundreds killed in Brazilian disco fire.”



Donald P. Bliss
Vice President of Field Operations for NFPA

The stories shock and sadden us, and we become focused, even if for a moment, on fire protection concerns in faraway places. Sometimes we learn something new that can be applied to fire protection practices in the U.S. or that could contribute to a change in an NFPA standard. More often than not, though, the fire’s cause, the building performance, and the human loss are the results of factors that are well known and preventable.

Unfortunately, these high-profile incidents don’t really tell us much about the global fire problem. Very few nations collect detailed information about fire, and some won’t reveal the data that they do collect. Insurance loss data can be useful, but even the definition of a “fire death” can vary

from country to country. Without accurate fire data, governments and safety advocates are unable to justify the need for fire prevention, public education, and code enforcement capabilities, and they cannot effectively budget for and deploy firefighting resources or build resilience for natural and man-made disasters.

What can global fire data, synchronized with big data, tell us? We can have a better understanding of how demographic trends, economic shifts, fire service operational capabilities, and human behavior will impact fire deaths, injuries, property loss, and overall community resilience. This is particularly important in developing nations, where rapid urbanization can result in increased population densities, substandard housing, high-rise construction with little regard for code compliance, and a lack of adequate water supplies for fire protection. Without good fire data, little will be done to alleviate what the World Bank describes as “small, chronic disasters”: fires that kill and injure people, destroy property, and serve as major obstacles to establishing robust and healthy societies.

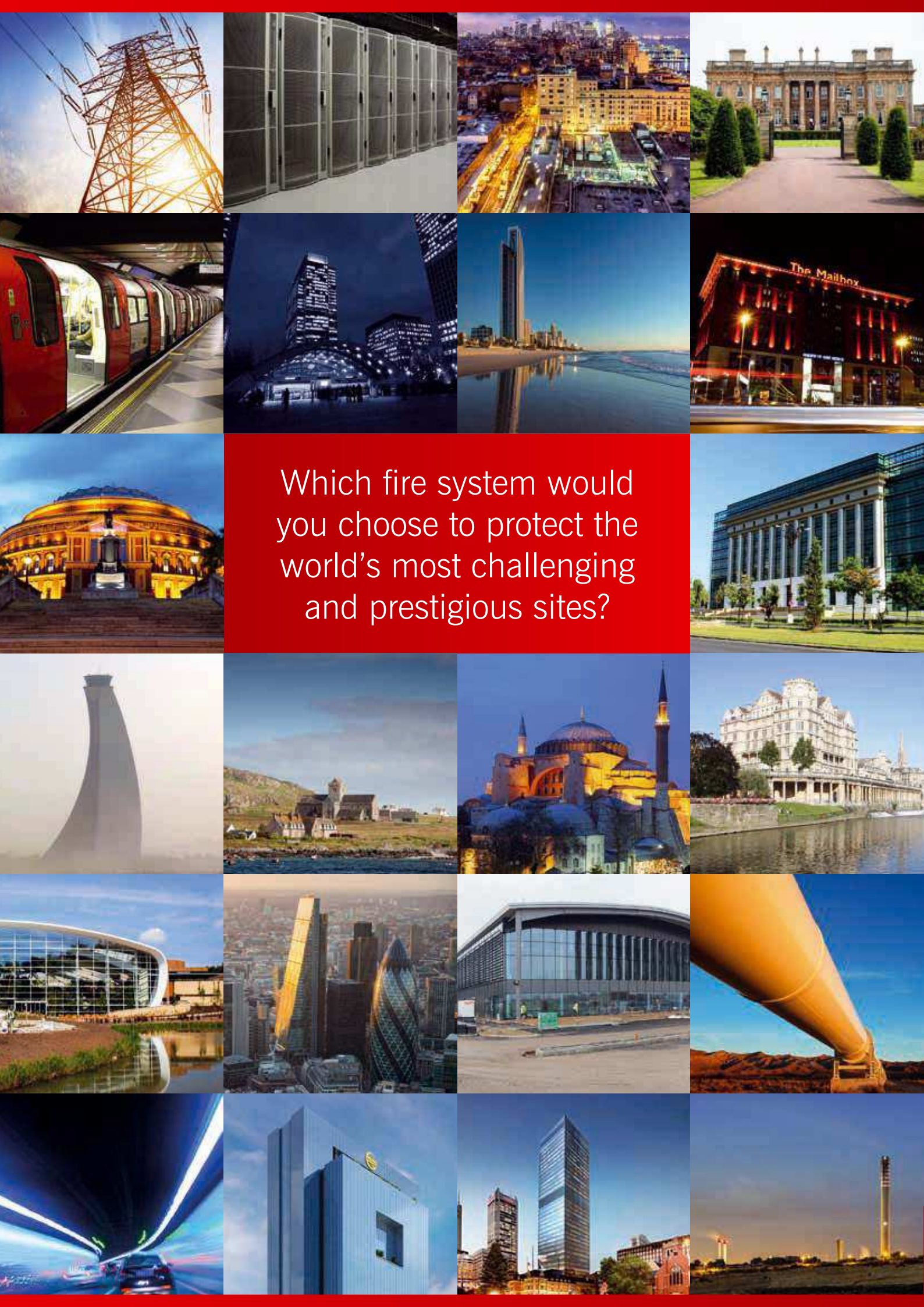
We know a lot about the U.S. fire problem, thanks in no small part to the fire departments that participate in the National Fire Incident Reporting System (NFIRS). NFIRS, along with other data sources, enables NFPA to produce a wide range of reports and studies concerning the causes of fire and its

impact on society. Our new strategic initiative focusing on data collection and analysis includes activities to improve the quality and usability of U.S. fire data and will support the development of fire data systems in other nations.

For many years, NFPA has been a co-author of the “World Fire Statistics” report issued by the International Association of Fire & Rescue Services. This annual report offers data on fire issues from 80 countries and 90 capital cities. NFPA is collaborating with the Canadian Association of Fire Chiefs and the Canadian Council of Fire Marshals and Fire Commissioners as they build a national pilot database to systematically record fire incidents. NFPA has provided technical advice and financial support for the development of the National Statistical Register for Fire and Incidents in Argentina. The volunteer fire service and the federal government of Argentina now have a unified system in place that informs decision-making concerning resource allocation, training, planning, and incident mitigation. It is hoped that this system will serve as a model for the implementation of similar systems throughout Latin America.

We have just begun to scratch the surface on analyzing the global fire problem. Today’s big data capabilities will produce useful, actionable guidance for strategies that save lives.

 For more information, go to www.nfpa.org



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the EN54 World



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 **Advanced**
The Standard in Fire Systems

Controlling false alarms in care homes

False and unwanted fire alarms are one of the big issues in fire safety and building management today.

The care home and social care industry in particular has unique needs when it comes to false alarm management (FAM). To meet these needs, fire industry leader Advanced has released a new document that shows the potential of automatic fire systems to help reduce unwanted alarms in these settings.

The document outlines the features of Advanced's AlarmCalm FAM upgrade and its key components, as well as providing an overview of the areas within care homes where different false alarm strategies may be required, based on risk, building design and resident needs.

AlarmCalm is a total package and features enhanced firmware, comprehensive configuration software for Advanced's fire systems and new intelligent alarm acknowledgement devices called AlarmCalm Buttons. It provides total, easily-managed control over alarm verification periods and investigation delays to outputs.

It allows a site to be divided into false alarm management zones called building areas (up to 200 per panel or 40,000 per

network). These are virtual areas used for FAM programming that by default match fire zones but can be set independently to cover multiple zones and points or individual points. The use of building areas makes even complicated cause-and-effect easy to set up.

There is growing awareness of the role that care home staff can play in helping to reduce unwanted false alarms. Advanced's intelligent, loop-powered alarm acknowledgement device, the AlarmCalm Button, can be used to manually verify if an alarm signal is false, for example from smoke as a result of cooking or heat in the kitchen.

By pressing the AlarmCalm Button, a staff member initiates a 'second stage' verification time and (optionally), the local sounder can be silenced. If after the second stage time the signal has cleared, the system will reset to normal conditions. If the signal in the detector is still present, a full fire condition will be signalled. During the second stage period, a fire condition is also indicated if the alarm is confirmed by another method such as sensitivity change or second detector. AlarmCalm Buttons can only extend verification time once



(before a system reset). If a real fire ensues, a full fire condition will be signalled.

Advanced believes AlarmCalm is the most easily installed and configured FAM system available. AlarmCalm Buttons are easy to install on the loop and recognised in the panel software on auto learn. They are compatible with a standard UK single-gang back box, can be flush or surface mounted and include a configurable LED, buzzer and slide-in label.

 For more information, go to www.advancedco.com

Panda enclosure protected by FFE

Zoo Negara in Kuala Lumpur has installed FFE's Fireray beam smoke detectors in the panda enclosure and viewing area. The detectors are designed to trigger a smoke spill fan in the event of a fire.

Because of the atrium's high ceiling, conventional smoke detectors were not suitable for this installation," commented Mr K. S. Yau of Prospect Safety Technology Sdn Bhd, the installation company. "A sprinkler system was also not an option due to their slower response times. Beam detectors were therefore best for this installation due to their extremely fast response times," he added.

Beam smoke detectors provide wide-area detection and are used when it is impractical, inappropriate or not cost-

effective to use traditional point-type detectors. They are ideally suited to large interiors with high ceilings, such as the panda enclosure, as they enable coverage of a large area at minimal cost.

A particular challenge of this of this application was the possible effects of spotlights and sunlight, which can affect conventional beam detectors by giving false readings. FFE has developed patented light-cancellation technology specifically for this type of installation, however. By actively monitoring ambient light levels on the detector and 'subtracting' them away from the 'real' signal, the Fireray detector can operate under the most difficult light conditions, including bright sunlight.



 For more information, go to www.ffeuk.com

New passive fire protection product wins Heathrow refurbishment

A new entrant to the passive fire protection world branded PassiveTec® has been awarded the prestigious refurbishment of Heathrow's tunnels.

The product is owned by a joint venture between (SIG Plc), a £2.6bn company, which is Europe's largest distributor of specialist construction materials, and PFP Fire Systems, a group of experienced fire protection engineers.

PassiveTec® fire boards have been used both as soffit lining and wall cladding to provide a complete RWS standard of protection in both the main tunnels and cargo tunnel. The highly innovative solution using the thinnest RWS rated board globally, at just 24mm, was praised by Nick Beedle, Head of Operations at VVB Engineering Services, who are the project's M&E contractors.

He said: "This is a cost efficient, visually attractive installation created from a world-class product and a collaborative approach from PassiveTec."

Simon Burgess, Director at SIG Plc

said: "This is a highly important strategic move for us as we build our presence in the global infrastructure market. Our own brand and service model offer tunnel contractors genuine choice when they select their passive fire protection partners."

The contract is for the refurbishment of two lane inbound/outbound tunnels, along with side bores and a cargo tunnel on the air side.

Due for completion later in 2016, it is part

of a significant upgrade of infrastructure and fire safety at Europe's busiest airport.

Simon MacDonald, PFP Fire Systems Managing Director said: "The win is a highly significant event for fire protection in tunnels worldwide that will alter the competitive context permanently for the benefit of all connected to the industry."

 For more information, go to www.passivetec.com



Apollo appoints Global Finance Director

Apollo Fire Detectors has appointed Pete Browitt to the post of Global Finance Director, reporting directly to Apollo's Managing Director EMEA, Steve Brown.

Announcing the new appointment, Steve, said: "We are delighted to welcome Pete to the management team. Pete's wealth of finance expertise – coupled with a proven track record in project management – make him a valued new Apollo staff member. I'm confident his considerable experience will bring a host of other benefits to the company."

Pete graduated with a BSc in Physics from the University of York. He is a member of the Chartered Institute of Management Accountants (CIMA) and his career encompasses a variety of financial

roles at 3M and HALMA. Most recently, Pete held the post of Finance Director at Avire – another HALMA company. He was also appointed as HALMA Fire Sub Sector Finance Director, a position that he will continue to hold in addition to his new role at Apollo.

Commenting on his new role, Pete said: "My involvement with HALMA's Fire Sub Sector made me very aware of Apollo and its position as the biggest company in the group. I'm looking forward to this exciting new opportunity and the chance to work for such an innovative company within this vital industry."

Managing the global finance and IT teams at Apollo, Pete will work closely with Apollo's offices in the USA and China.



 For more information, go to www.apollo-fire.co.uk

Marioff launches new HI-FOG® electric pump unit

Marioff Corporation Oy have announced the launch of a new HI-FOG Electric Pump Unit (EPU) for the high-pressure water mist fire suppression segment. Incorporating closed loop pressure control, the EPU revolutionizes pumping technology for high-pressure water mist technology. Marioff, a leading developer of the water mist fire protection technology, is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp. (NYSE: UTX).

Different from industry-standard pump design, the EPU's advanced control system ensures that the pump unit provides only the required pressure and flow. Pressure optimization is achieved with an advanced software control and a frequency converter. Excess water unloading is no longer needed, which simplifies the mechanical design of the pump skid. The pump unit incorporates many built-in redundancies, including activation and pressure control, to ensure operational reliability.

The EPU is equipped with a user-

friendly interface that provides a real-time status of the pump unit and the HI-FOG system, alarm and help information, maintenance reminders and event history ensuring efficient and optimized maintenance activities.

The EPU consists of a modular pump skid and separate control cabinet. The modular structure together with practical service access enables flexible installation and optimized use of footprint. Different configurations can be put together depending on the system capacity requirements.

"Our state-of-the-art pump technology keeps Marioff in the forefront of the technical development of high-pressure water mist solutions," said Isto Hantila, managing director, Marioff Corporation Oy.

"The EPU is the new core of the HI-FOG system that will provide an excellent platform for taking new features like remote monitoring in use to improve the maintenance and servicing," said



▲ The HI-FOG EPU's unique modular structure enables flexible installation, optimized use of footprint and different configurations depending on the system capacity requirements.

Markku Vuorisalo, director, engineering, Marioff Corporation Oy.

The HI-FOG EPU is suitable for buildings, industrial and marine applications and will be available beginning in May 2016.

For more information, go to www.marioff.com

Tyco increase restaurant nozzle heights

Tyco Fire Protection Products, a global leader in total fire suppression solutions, has introduced increased nozzle heights for its ANSUL PIRANHA Restaurant Fire Suppression Systems. Featuring a UL and LPCB performance tested design, this new enhancement enables agent discharge nozzles to be installed at increased heights of 54 to 84 inches (1.4 to 2.1 meters) from the top of the hazard zone, while providing



the reliable protection commercial kitchens need in today's environment.

Installing the nozzles out of view eliminates the need for visible drop piping. Along with enhanced kitchen aesthetics, increased heights simplify hood cleaning and servicing, and minimise downtime and cost. Nozzle redirection can be potentially hazardous to staff and must therefore be taken into consideration in today's kitchens. It is important to reduce the potential for intentional or inadvertent nozzle redirection and obstruction.

"It's not as easy as increasing the nozzle heights," says Mark Neumann, director pre-engineered systems, Tyco Fire Protection Products. "They must also be tested. We have been diligent with performance testing nozzles to help ensure that spray patterns have been adjusted for the maximum effectiveness at increased heights."

"Customer and employee safety is always our number one goal," adds Mark. "With that said, we constantly look for ways to improve aesthetics without sacrificing fire protection effectiveness. With restaurant owners looking to create a more unique dining experience, and the trend for exhibition kitchens on the rise, the appearance of these spaces is more important than ever. Keeping nozzles out of view helps restaurant management to create a better dining experience for customers."

PIRANHA systems are designed to cool up to 15 times faster than conventional single agent systems and use 60 per cent less agent. This superior system offers flexible overlapping nozzle coverage, maintaining rapid flame knockdown and securement.

For more information, go to www.ansul.com/restaurants

Advanced to protect Tyne and Wear Metro

The Tyne and Wear Metro system, widely considered the first modern light railway system in the UK, is being protected by intelligent fire systems from Advanced after the industry-leading manufacturer provided it with new fire alarm panels.

Nexus, the public body which owns and manages Metro, upgraded fire panels at 50 locations on the system, including 21 stations and at other key pieces of its infrastructure including relay rooms, vent shafts and other operational buildings.

Many of the busiest sub-surface Metro stations in the centre of Newcastle and Gateshead were part of the installation work, including Monument Metro station which is used by ten million passengers a year.

The project was part of the £389m Metro all change modernisation programme, which involves the refurbishment of Metro stations, trains, and other key infrastructure in an 11 year programme.

Advanced's reputation for producing the highest quality fire systems has helped to achieve rapid expansion throughout the UK and worldwide.

The fire panels which have been installed on the Tyne and Wear Metro, which has the fastest passenger growth of any light rail system outside of London, are cutting edge MxPro 5 models, compatible with multiple external components and renowned for their quality, reliability and flexibility.

The contract for the installation was awarded to leading North East Electrical Contractor Veale Nixon, who selected The Dante Group to supply and commission the Fire Alarm Systems. As Advanced partners The Dante Group selected the MxPro 5 Panels. The MxPro 5 can be used in single loop, single panel format or easily configured into high speed, 200 panel networks covering huge areas and tens of thousands of field devices. The panels installed in the metro stations vary from two loop to four loop panels depending on the size station and report to a BMS/ Graphics systems via IP.

Neil Corney, Director of Dante Group, commented: "We have worked with Advanced on numerous projects in the

past and zero hesitation in selecting an Advanced network for the installation on the Tyne and Wear Metro. We needed a cutting edge system to protect a transport system that is used by thousands of people every day and the Advanced panels give the option to expand and enhance in the future."

Advanced's legendary ease of installation and configuration and wide peripheral range make it customisable to almost any application and it is found in challenging and prestigious sites around the world. The MxPro 5 panels installed



at the Tyne and Wear Metro Stations are among Advanced's best performing fire systems and one of the few available approved to EN54 Parts 2, 4 and 13.

For more information, go to www.advancedco.com


Dr. STHAMER HAMBURG

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If you are tired of wasting money inspecting detectors regularly, this is the all-in-one combined tester for both heat and smoke detectors. At the touch of a button, you can simply put either the heat detector or smoke detector to the test without changing its head. FIREVIEW has a very strong competitive price in the market, which is almost a half of the price of competitors' products.

Besides, using FIREVIEW lets you save money since you can manage it with almost zero extra charges. Without the need to purchase the smoke spray, which might damage your detectors from leftover residue within it, FIREVIEW's smoke generation system enables you to test approximately 2000 smoke detectors with only a bottle of smoke oil (\$25). This is not magic. We have been trying to find a better way of helping our customers, and this led us to create this product. We successfully invented the system using 40 years of fire engineering experience in the field.

In addition to that, the affordable and sustainable smoke generation system reduce the unnecessary costs like additional spray purchases, and offers complete prevention of deterioration of detector sensitivity. The smoke from the tester is not poisonous to humans and

it activates the detector instantaneously. Not only is FIREVIEW certified by UL, but also the smoke oil is UL certified. Another exclusive thing that FIREVIEW has is that the fan attached to the head of the inspection pole automatically removes any residual smoke remaining inside the detector once the inspection is completed.

Heat is comfortably activated by just pushing the red button on the controller. It reaches temperatures of between 50-70°C with one run, and the maximum temperature it can reach is up to 100°C with about three runs.

This is not the end of story. You can do even more than that with FIREVIEW. Add-on's enable customers to benefit from a few more features. You can not only test the Fixed Temperature Heat Detector (Explosion Proof Detectors), but also the Flame Detector Testers (Infrared Detectors) just by changing the head of the tester.

Using the detector removal tools, that can be attached to the inspection pole, various types of ceiling mounted detectors can be easily removed. Detectors on a high ceiling? No problem at all. The 6m/10m Extension Poles are here for you. The standard pole extends up to 2.4m and you can even make it much higher up to 10m with the replaceable extension pole. By just simply replacing the standard inspection pole with the extension pole, you can effortlessly test/remove fire detectors on ceilings.



A FIREVIEW set includes a test head with standard inspection pole, carrying bag, controller, case, fast charger, pole belt, and a bottle of smoke oil (100ml). All components are exquisitely made and assembled in Korea, and we deliver to anywhere in the world. If you have any question, please contact us at fireviewamerica@gmail.com.

For more information, go to www.wonfire.co.kr

Warning sign range extended!

Kentec's wide range of illuminated warning signs now includes an IP66 rated weatherproof version, consisting of a polycarbonate enclosure with metal chassis. As with the other signs in the range, it is available with standard or customised text and language versions.

The Kentec range employs the very latest in LED technology to provide a high reliability, high brightness,

audio/ visual warning indication unit. The brightness of the sign remains constant over its entire operating range of 15 to 30 volts DC due to its unique 'power boost' circuitry. This ensures that even with a system running on depleted batteries, all signs remain at full intensity.

For more information, go to www.kentec.co.uk



FFE's Talentum protecting Winters Recycling

To protect its waste recycling facility from fire hazards, Winters Recycling Ltd has installed eight Talentum Dual IR optical flame detectors at its Hitchin site.

"Talentum flame detectors are a great fit for our site, where the risk of fire is significant," said Winters' Operations Manager Mark Chinsky.

Talentum flame detectors are ideally suited to waste handling as they can detect almost all types of flickering flames, not just hydrocarbon flames. This is especially important in the waste industry, where flames can originate from many different sources, including paper, plastic and even metals. By utilising infra-red (IR) sensing, Talentum detectors can also identify flames irrespective of any dust, steam or smoke present, and are immune to the effects of wind or draughts.

How flame detectors work is

straightforward: optical sensors receive the IR and/or UV radiation emitted by the flames and a processor analyses the optical sensor signal waveforms and determines if they represent flames and, if so, accepts them. If the signals do not match the internal algorithms for flames then they are considered to be false sources and rejected.

In waste handling facilities, flame detectors are usually installed as part of a complete fire detection and suppression system. If a shredder, for example, catches fire, as soon as the flame detector recognises that there is a fire, it passes a signal which automatically stops the machinery and initiates a fire suppression system.

FFE's Talentum flame detectors are the only ones on the market capable of detecting 99% of all types of fires in a single



unit. This makes them ideal for all types of waste handling facilities – from small, mobile compactors to large recycling facilities such as Winters.

Every year fire destroys millions of pounds worth of raw material and equipment in the UK. According to the UK's Chief Fire Officer Association, there were 298 fires in 2013, costing the industry untold millions in lost revenue. As well as being a danger to workers, fire can also cause extensive damage and financial loss, so its effective control is essential.

For more information, go to www.ffeuk.com

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*The numbers may vary according to operating conditions.



TLX Technologies

Newly developed actuators provide additional system intelligence

Protection of life and property has always been the primary purpose of fire suppression systems developed by manufacturers globally. While configuration of these systems can differ based on the system components, the extinguishing agent and the environment in which the system is used, the objective remains the same.

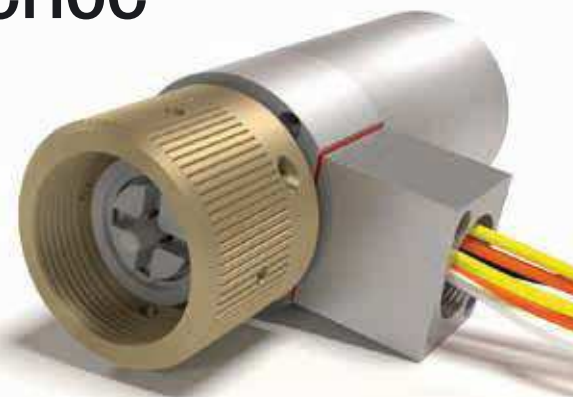
One of the key components in a fire suppression system is the releasing device that mechanically initiates the discharge of the extinguishing agent that will combat the fire. Many systems utilize an electric actuator as the system's releasing device. Two common forms of this electric actuator are a latching solenoid actuator and a direct-acting solenoid. The releasing device is attached to the discharge valve on the cylinder storing the suppressant and is electrically connected to the fire alarm control panel. Once the actuator or solenoid receives an electrical signal, it will deploy, causing the release valve to dispense the extinguishing agent into the system.

Fire suppression systems are highly effective for extinguishing fires but are also open to potential failures due to human error during installation, routine maintenance or functional testing of the system's releasing devices. If an actuator is not properly installed onto the discharge valve, it will not operate correctly to dispense the extinguishing agent, resulting in a system

failure. Without an installation supervisory signal between the releasing device and fire panel there is no indication of proper installation leaving the responsibility of accurate installment solely on the technician who removed the actuator for maintenance or testing purposes. Industry regulators quickly recognized that adding supervisory requirements to the releasing device would provide for the necessary alarm (both visually and audibly) to alert the technician on whether the actuator was correctly installed and in the right position for proper system functionality.

TLX Technologies is excited to introduce our next generation of supervised fire suppression actuators at the 2016 NFPA Expo in Las Vegas this month. TLX's supervised latching solenoid actuator as well as our newly developed pneumatic actuator and supervised direct-acting solenoid for fire suppression systems will be showcased.

All of the releasing devices developed by TLX Technologies for fire suppression systems meet required UL and NFPA wiring codes and standards. An internal supervisory mechanism has been designed into each actuator to ensure that it is properly installed on the appropriate discharge valve of the extinguishing agent storage container. Integration of the supervision mechanism in our actuators eliminates the need for



additional components, connections and wire paths; resulting in a streamlined, NFPA-compliant solution.

Both the supervised latching solenoid actuator and the direct-acting solenoid come standard with six wires. Two wires are used for activation and four are used for supervision of both the releasing device's proper placement as well as electric connection to the fire panel. The pneumatic actuator is also available with the integrated supervision option providing peace of mind that all actuating devices on the suppression system are supervised for correct installation and connection. Factory-wired leads fed through an integrated conduit port in the housing are on every TLX developed actuator to meet the UL and NFPA wire codes required on all fire suppression actuators.

Choosing a TLX actuating device for your fire suppression system ensures a faster, more durable, reusable solution – expertly tailored to your exact needs. Each device rotates for easy installation on fixed systems and can be custom configured for your specific system requirements. All of our fire suppression actuators are designed for compliance to UL, FM, CE, PCB and VDE.

For over 15 years, TLX Technologies has worked with system manufacturers to develop and manufacture custom actuators and valves to meet the challenging demands of active fire suppression systems.

 For more information, go to www.tlxtech.com



▲ Supervised latching solenoid actuator with factory-wired leads.

◀ Direct-acting solenoid and pneumatic actuator with integrated supervision.

Images courtesy of TLX Technologies

We help suppression system OEMs meet regulatory standards with superior electromagnetic solutions.

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Images courtesy of LeaveFire

How much is your life and the lives of your family member worth?

- It's a tricky question that most of us never ask ourselves, but one we should if we are serious about protecting ourselves but most important our family
- What are you looking to protect?
- Why are you looking to protect it?
- How much is adequate?
- What is most effective for your life and your family?

The most common and obvious answer it could be: life insurance.

- Life insurance policies are important
- Life insurance policies provide insurance protection for the entire life
- Life insurance policies provide safety and security

But even life insurance policies have limits. More important, life insurance policies cannot guarantee anything in case of fire.

On the issue of security, and in particular on the issue of the fire, the community proves increasingly sensitive and attentive, given the potential life risk and fire damage that can ensure.

The evaluation of the risk of fire is a process by which you specify the risk level in a building together with the actions and measures to make it minimal. In this context, it assumes a major importance if the definition of active protections allow you to bring the risk to an acceptable level. Fire drills are important for all homes, including apartment buildings and other high-rise structures.

Everybody is aware that sometimes the safest thing you can do in a tall building fire is to stay put and await the arrival of firefighters. Even if the building is equipped with sprinklers and smoke alarms, in case of fire, none of us know how we will react psychologically, and often it happens that the way that seems the most logical in a

moment of panic (to jump from the window) is certainly the most dangerous.

Following the basic guidelines, staying by the windows is one the most important things to do. For this reason we developed LeaveFire®. Knowing that LeaveFire® is out of your window or on your balcony, you will aware to not jump into the void.

LeaveFire® keeps you safe as it is designed to provide a means of escape route quickly to escape during a building fire. Worldwide each year tens of thousands of people die and are injured in building fires. LeaveFire® does not pretend to reset these figures, but tries to reduce them significantly. LeaveFire®, is very easy to use. Mounted on the wall next to your window or on your balcony, LeaveFire® is always ready to use. In case of fire you have just to open the LeaveFire® box, grab the harness, wear it and leave the fire behind you. LeaveFire® will bring you down to ground level at a speed of 1 m/sec.

LeaveFire® comes in 4 different types

- Classic
- Multi
- Rescue
- Professional

The LeaveFire® Classic can be use several times because is retractable. There is no limit on how many people can use it. We have the LeaveFire® Classic 3, LeaveFire® Classic 6, LeaveFire® Classic 12, LeaveFire® Classic 24 and LeaveFire® Classic 36. It suitable for buildings from 3 floors up

to 36 floors (10 m/32 ft – 120 m/393 ft).

The LeaveFire® Multi is not retractable. It can be used by more people continuously and can be customized under client specifications. In this family we have the LeaveFire® Multi 4, LeaveFire® Multi 6, LeaveFire® Multi 8, LeaveFire® Multi 10 and LeaveFire® Multi 12. It suitable for the use from 4 till 12 people at once from height from 60m/196 ft till 18 m/60 ft.

The LeaveFire® Rescue can be used

in situation where you need to escape even in case of a non-fire emergency. It can be used on cable car, cranes, and boats. There are the LeaveFire® Rescue 30, LeaveFire® Rescue 60, LeaveFire® Rescue 120, LeaveFire® Rescue 240. It suitable for height from 30 m/98 till 240 m/787 ft.

The LeaveFire® Professional can be customized under client specification. The main areas where it can be used are in oil plants, oil refineries, gas and chemical plants.

LeaveFire® is designed with the newest know-how. Its functioning is based on hydraulic technology.

LeaveFire®

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- has the MBL of 1500 Kg
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- is always ready to use

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▶ For more information email info@leavefire.com



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SOLO

20 years of testing with world's most popular detector test equipment

Every day, thousands of fire engineers around the world set to work maintaining fire systems. Part of this involves the functional testing of fire detectors in accordance with both codes and standards and the recommendations of the detector manufacturers.

The majority carry out this work using, the famous 'red pole' and test head – products from the Solo range of detector test equipment.

Launched in the mid-90's, the product range started life with a specially formulated smoke aerosol (Solo A3) and an aerosol dispenser (Solo 330), mounted on top of a telescopic access pole (Solo 100). The range quickly developed a strong following – with many users keen to use what was seen as a more professional solution than alternative testers – such as hand-held aerosols. As standards developed world-wide and the range of detectors available increased, the demands placed

on the Solo range also grew. As a result of these demands, further products and enhancements were developed including additional testers and complimentary accessories – such as a detector removal tool and detector duster.

Some of the most significant developments since the initial launch have seen the introduction of heat detector testers – initially with mains powered devices and more recently with a unique cordless design – and the launch of a carbon monoxide detector tester compatible with the dispenser and access poles. Additions such as these have seen Solo grow from a smoke detector tester made up of a handful of tools to a complete range offering functional testing and maintenance for all smoke, heat and CO detectors.

Today, Solo has widely been adopted as the test equipment of choice for the industry. Its reliability and robust design have played a major part in this – as have the approvals of the leading detector

manufacturers and certification from third parties including UL and ULC.

Speaking about Solo, Sales and Marketing Director at Detectortesters, Phil Bartlam said:

"We're extremely proud of our Solo product range. Its universal design, reliability and ease of use have established it as the number one range of detector test equipment. Its popularity continues to grow in existing and emerging markets which, along with planned new products, means Solo has an exciting future."

Service and maintenance companies really value Solo and the role it plays in their day-to-day business. As a result words, such as these from Daren Pool at Triple Star Fire, are often said about the products: *"All our engineers use Solo! It's great kit which allows us to test all detectors quickly without fuss and it never lets us down."*

As well as the individual tools, an extensive offering of kits are now available providing ultimate choice to users depending on their testing and height access needs.

There's more to come from Solo too, its range of telescopic access poles are compatible with the all-in-one tester – Testfire and significant new products are set to be added to the Solo range next year. These products will build on the core qualities of existing Solo products – but also offer the widest range of benefits which are designed to carry the range into the next era of testing.

Detectortesters (No Climb Products) – the company behind Solo, will feature an "Evolution of Testing" time line on their stand at Firex International and will be running a prize draw for all Solo users who visit the stand. The Detectortesters stand will also feature Testfire – the all-in-one tester for smoke, heat and CO – and Scorpion, the increasingly popular test solution for hard-to-access detectors.

For more information, go to www.detectortesters.com

▼ Solo cordless heat detector tester.



▼ Smoke detector testing with Solo.



Image courtesy of NoClimbProducts



The world's most popular test equipment for smoke, heat & CO detectors

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Compact C-3-8 Ceiling
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Business Sprinkler Alliance

Fire continues to be one of the biggest risks facing UK businesses today

Fire continues to be one of the biggest risks facing UK businesses today. Research published earlier this year, found that fire and explosion accounted for six out of 10 of business interruptions claims globally, with an average loss of £1.7 million (Allianz – Global Claims Review 2015). Closer to home, Research by FM Global, which looked at claims data collected in the UK between 2008 and 2013, found that fire poses a greater combined frequency and severity threat to business than anything else. The research also found that fire was the most common form of property loss and disruption only after flooding.

Although fire sprinklers have proven to be an effective way of mitigating against this risk, these findings demonstrate that there is still much to be done to reduce the impact of fire on business interruption and to raise awareness of the benefits of sprinklers.

High-profile incidents such as Pure Wafer's factory fire in Swansea and the destruction of Dowty Propellers production facility at Staverton last year show the very real impact on businesses up and down the country. Pure Wafer was forced to make 115 redundancies following the fire, whilst Dowty Propellers has only recently been given planning permission for its new site.

In contrast, an incident at BPI Films in Leominster earlier this year was avoided through activation of fire sprinklers, which allowed the company

to open as normal the next day. Further afield, the huge fire that broke out in The Address skyscraper in Dubai was prevented from spreading into the interior by internal sprinkler systems.

The Business Sprinkler Alliance, or BSA, was established in 2010 to foster greater business resilience by enhancing protection against fire through the increased acceptance and use of fire sprinklers in commercial and industrial premises. As a coalition of fire safety professionals, we aim to create a culture of understanding and acceptance around the benefits of sprinklers. It is crucial that individuals and businesses who design, construct and approve new commercial properties understand the role that fire sprinklers play – not only in protecting employees but also as a long-term cost effective risk management method for businesses.

Fire sprinklers can help save lives. However, the examples above show that sprinklers can also reduce the impact of fire on businesses and local communities by minimising disruption and limiting building damage. Research commissioned by the BSA and conducted by BRE Global and Cebr on warehouse fires found that sprinklers minimise both the cost and impact of fire on the economy and local communities. Furthermore, sprinklers can support business continuity, save jobs and protect the environment.

Whilst sprinklers can be retrofitted into almost any kind of building (including

listed or historic premises), sprinklers should be considered at the earliest opportunity in the design process and not in isolation or as part of the retrofitting process. The first phase of any building project will involve discussions between architects, designers and the property owners, who will brief them on the proposed use of the building and outline any specific requirements. Critically, the potential risk and the importance of the facility need to be assessed.

There is often a perception that sprinklers will be restrictive to the design process, when in fact, sprinklers can allow for a more inventive use of space. Current building codes work on a performance-based approach to the safety of a building. This means that by including sprinklers, designers will have greater freedom to deliver their vision. Sprinklers can allow a more interesting use of space giving rise to better and more creative designs, protecting future occupants from fire and by meeting the intent of building regulations.

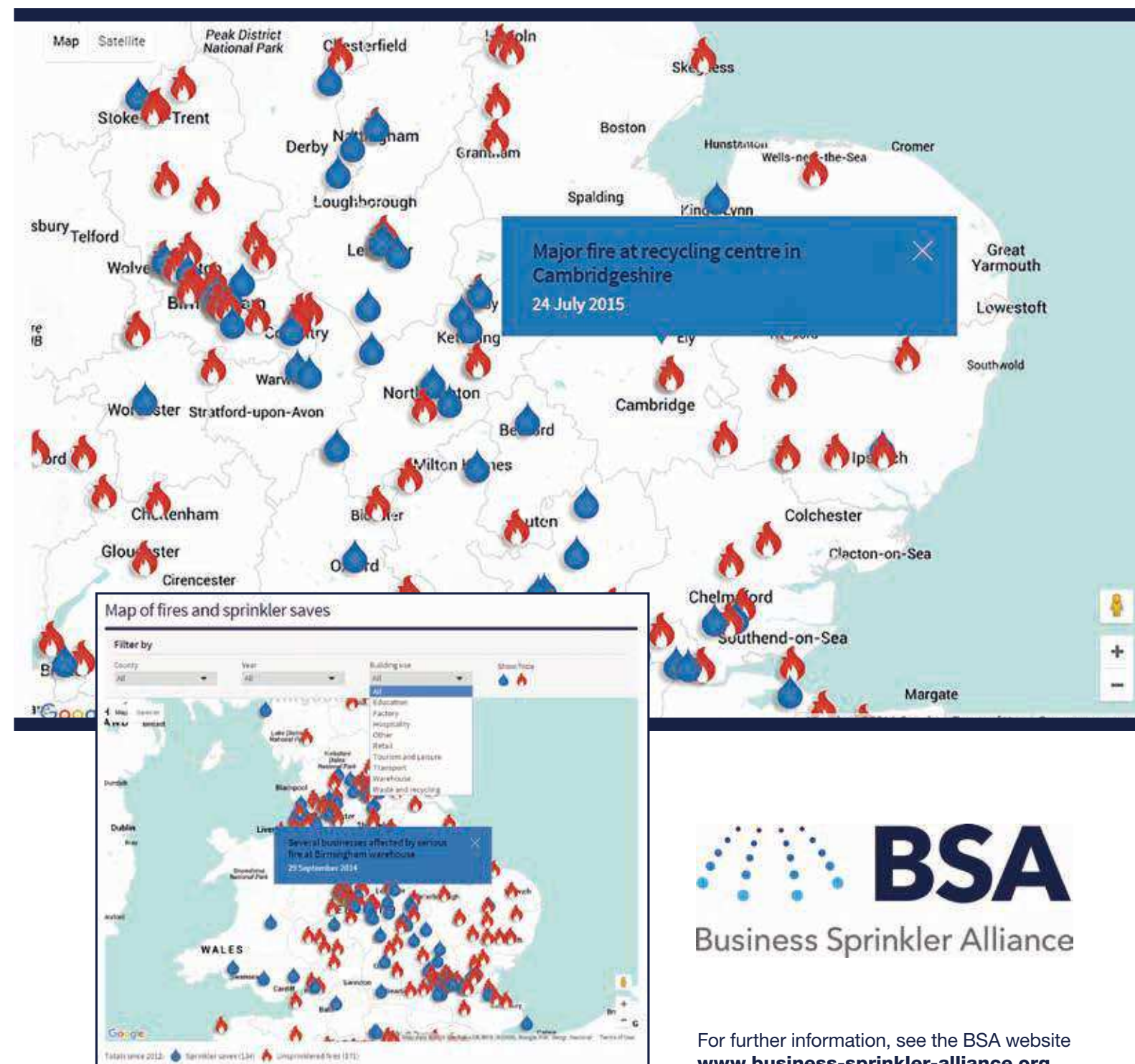
There is no doubt that sprinklers are an effective means of ensuring business continuity and minimising the impact of a fire. However, we continue to trail our European counterparts when it comes to fire safety guidance. The UK guidance only applies to premises over 20,000m². Countries such as Germany, Spain and France apply the regulations to much smaller building sizes, ensuring businesses have a more effective fire protection in place with sprinklers.

We need to work harder to help bring about a change in attitude. We need to shake off the view that sprinklers are restrictive and in fact will not only help architects maximise their own design process, but also protect buildings through their lifecycle.

 For more information, go to www.sprinklersaves.uk

The **Business Sprinkler Alliance**, BSA, is calling on all Fire and Rescue Services, and others who hold such data, to help update its new **interactive map** detailing sprinkler saves and significant fires across the country.

Please visit www.sprinklersaves.uk or contact us on info@business-sprinkler-alliance.org to find sprinkler saves and fires in your county since 2012.



 **BSA**
Business Sprinkler Alliance

Kentec Electronics Ltd

Compliant extinguishant control technology

With the launch of their much-anticipated Syncro XT+ Multi Area Addressable Extinguishing Panel, Jonathan Gilbert General Manager – Sales & Marketing of Kentec Electronics, reviews the technological foundations of extinguishant control panels.

Most fires cannot be sustained with less than 15% Oxygen, a phenomenon of physics central to the development of inert gas Automatic Fire Extinguishing Systems. It is also a reason why this technology is specified in environments where system continuity is critical, and fire prevention management of the highest reliability is essential.

However, only in recent years has the design and functionality of the control panel for fire protection extinguishing systems been defined by its specification within a common standard.

Kentec was the first company to introduce an EN12094-1:2003 compliant extinguishing panel. Since 1985, the company has specialized in comprehensive systems for extinguishant control together with the design and manufacture of a wide range of standard extinguishing control panels.

EN12094-1 became a harmonized standard in 2006. It is a measure of Kentec's

command of this specialised technology that, at the time of harmonization, the company was the only manufacturer able to apply the CE mark showing compliance with the Construction Products Directive to any type of fire control panel.

Notable developments in the design and functionality of Kentec's extinguishant control panels and ancillaries have included: the expansion of configuration options for versatile programming; the enhanced wide choice of inputs and outputs; the serial interface to ancillary items such as status indicator units to reduce wiring; and the simple connectivity for ease of installation for rapid commissioning.

At the heart of Kentec's integrated control solutions for extinguishing systems is the Sigma XT range of extinguishing panels. Simple, powerful and highly configurable, they feature a large range of ancillary items that connect via a serial bus, including: Sigma Si status indicator units with and without controls (including a weatherproof version) and relay output boards for remote control of plant or remote signalling. Many of the characteristics of its authoritative design have been copied by other fire alarm control panel manufacturers.

New Syncro XT+ multi area addressable extinguishing panel launched

The new Syncro XT+ addressable multi-area extinguishant control panel, fully approved to EN12094-1, EN54-2 and EN54-4, provides addressable detection over 1 or 2 loops with 16 Zone LED Indicators and is available with up to four extinguishant release control units built in.

The extinguishing modules between the Syncro XT+ and the Sigma XT+ share many common features. The extinguishant control modules on the panel have a comprehensive set of inputs and outputs to monitor and control the extinguishing system whether it be gas, aerosol or another. Being configurable via a simple programming interface means that the panel can be programmed to meet the clients' specific requirements. All extinguishant areas may have up to 7, serially connected Sigma Si status indication and control units or ancillary relay boards connected via a simple 4-core cable.

Sigma XT+ control panels are multi-area extinguishant control panels complying with EN12094-1, EN54-2 and EN54-4. Up to 8 zones of conventional detection with up to 4 extinguishant areas are available.

Stand-alone extinguishant control units are also available with 2 monitored inputs to receive initiating signals from remote fire detection control panels or addressable modules.

The versatility of the control panel can be enhanced further by the fitting of up to 7 Sigma CP Ancillary boards (K580) or Sigma CP Sounder boards (K461) to the RS485 serial bus.

Simple intuitive configuration

All Sigma XT and Sigma XT+ control panels feature Kentec's removable bridge plate concept, which makes installation easier and reduces the risk of damage to the panel's sensitive electronics.

 For more information, go to www.kentec.co.uk



Image courtesy of Kentec Electronics Ltd

 **Kentec**
Electronics Ltd



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Air sampling smoke detection on mobile mining equipment

Very early warning air sampling smoke detection (ASD) has traditionally been thought of as a technology only suited for clean environments. Many fire industry professionals believe that factors such as dirt, dust, moisture, vibration and other harsh conditions preclude the use of air sampling smoke detection because of nuisance alarms and detector maintenance issues. This is unfortunate because harsh industrial environments have a much greater risk of fire than the standard clean environment.



Peter J. Wynnyczuk

Industrial facilities also tend to have on-going maintenance activities such as welding and metal cutting that can set in motion smoldering and a possible fire situation well after the work has been completed. For these reasons and others, very early warning air sampling smoke detection serves to provide increased value to any industrial facility, including mining.

In terms of possible fire hazards relative to heavy machinery, these include very high voltage electrical cabinets, large motors, conveyor belts, lubricants, flammable liquids, moving parts causing friction, and less than ideal housekeeping.

Because of a worldwide risk audit of major mobile mining equipment,

an international mining company was interested in evaluating secondary smoke detection options in one of their P&H 4100 electric rope shovels. The company was subsequently introduced to VESDA ASD.

This type of equipment has both very high voltage and hydraulic/lubricant potential fire hazards. It also has all the aforementioned operational challenges for air sampling smoke detection. The electric rope shovels are the beginning of the ore processing supply chain and any disruption at this point would cause problems throughout the production process. As in most mining facilities, the cost of lost production would be much greater than the cost of the lost equipment. Whilst heavy machinery fire risks exist globally, a recent fire at a Canadian gold mine's processing facility caused the stock exchange

▼ P&H 4100 electric rope shovel during a scheduled maintenance shutdown.



Image courtesy of Xtralis

Peter J. Wynnyczuk is an industrial application consultant for Xtralis in the USA.



listed company to issue guidance regarding their 2012 production and the stock price dropped 25%.

The mine's mobile maintenance department also realized the value of the ASD data for preventative maintenance. Under normal operations motors and other pieces of equipment used in the shovel should not produce smoke. The presence of a significant amount of smoke in these areas might not lead to a catastrophic fire, but could be a signal of an impending equipment failure. The mobile maintenance department knows that early detection of an impending equipment failure can provide for a quick reaction that will save maintenance costs and avoid unplanned downtime. Due to the high cost of replacement parts, labor and above all lost production, these professionals understand an early warning ASD system can easily

pay for itself by detecting one potential equipment component failure.

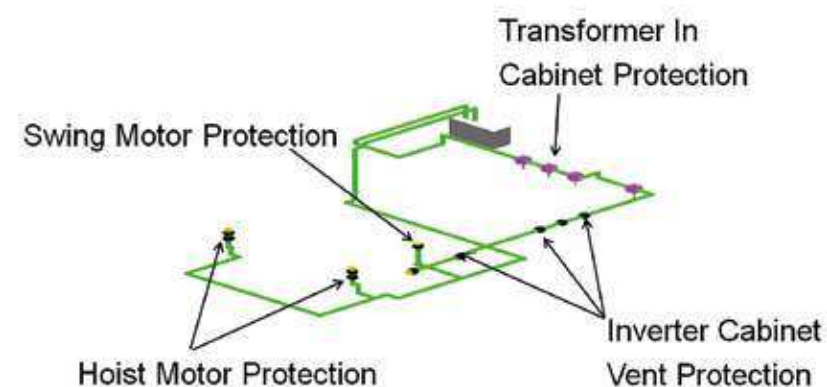
The engineering drawings from the shovel manufacturer could not be easily obtained and site surveys and hand measurements had to be taken. In an industrial design there are a number of challenges regarding system component placement. Operators and maintenance crews will have a lot more interaction with a smoke detection system in this environment than the workers in a standard office or warehouse. The system was designed with two zones. The first zone (Zone #1) was designed to protect the electrical cabinets with both in cabinet sampling and cabinet exhaust ventilation sampling. The second zone (Zone #2) was designed to protect the lubrication/hydraulic room and the exhaust vents of the hoist and swing motors. Blazemaster CPVC

▲ Protecting both hydraulic and electrical fire hazards.

pipe was used as the main sampling air transport pipe with 3mm sampling holes field drilled and labeled. Capillary tube and sampling bulkheads were used to sample in the electrical cabinets. The detectors, 24DCv power supply and battery back-up were pre-wired and attached to a single mounting plate. The detectors were offset from the main mounting plate with anti-vibration spindles. The displays with annunciators were installed in the operators cab, but all indicators were turned off so not to disturb the operator with alarms during the test period. In the case of a sole operator in a production environment, constant or unexplained alarms will result in the removal of the system.

The installation was performed during the week of June 20, 2011 coinciding with a major maintenance "down" scheduled for 4 days. Working in an active mining environment under a strict timeline presented a number of challenges for an installation team. The scheduled start-up of the shovel back into production was not going to be delayed due to delays in the installation of this demonstration system. This factor makes steps like the pre-installation assembly of the detector mounting plate an important function that saves the installation crew valuable time. The installation crew also had to work around the maintenance crews performing scheduled work and then wait for

▼ Zone 1 sampling pipe design.



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assistance when required. When working on a major mine site another project management challenge is that federal mine safety regulation and company safety policies are strictly enforced and can create long time delays. One example is that at 1:00 pm every day the worksite had to be cleared for a 2:00 pm blast and a 3:00 pm all clear signal. These and other safety related factors contributed to long hours for the team and some deviations from the original design. Although many of the factors resulting in lost installation time can be identified, a project manager needs to build an educated guess of unknowns into the schedule.

Every industrial environment will have a different operational profile and the corresponding background particulate levels will differ between industry and even specific process. In some applications the particulate levels will be relatively stable and in others there can be sharp unexplained spikes in levels. This is the reason why for industrial applications a sufficient background particulate data collection period needs to be determined. Each application will have a different time period that is decided upon by discussions with the operational personnel and a determination of possible changes that could occur. The operational profile of an electric rope shovel is extremely dynamic because of multiple external factors and it was decided

that the test period of a minimum of six months would be required to determine the suitability of the system for the application. The test ended-up running for a seven month period from 6/25/11 to 1/31/12. This time period was also chosen because it covered both summer and winter months.

Early in the test period the shovel experienced an "arc-over" in an electrical BUS cabinet that automatically shut down the shovel. After an examination of the detector's recorded data and consultations with the mobile maintenance department, it was determined that the incident was detected by the Zone #1 detector approximately 1 minute before the automatic shutdown with the obscuration level immediately reaching 10% obscuration per foot and the detector going into a Fire 2 alarm. About 20 seconds later Zone #2 went into Fire 2 alarm and reaching 3% obscuration per foot due to the dissipation of the smoke throughout the space. It took about an hour for the detectors to return to normal operational levels. It is believed that once equipment specific alarm levels are set and the shovel operators are comfortable with the accuracy of the alarms, it would have been possible that some sort of preventive action could have been taken to reduce the severity of the disruption.

The test was determined to be a

Remote display provides the operator with situational awareness.

success and it was decided that a permanent system be installed using the lessons learned. The mobile maintenance department requested the addition of a third zone to isolate and protect the critical high voltage electrical components with the highest probability of a fire. They wanted the added addressability to give the operator more information about the location of the smoke event and therefore help to determine the best course of response. It was also decided that sampling over the electrical cabinet exhaust vents exposed those sampling points to interferences from outside the cabinet. To keep the alarm obscuration levels as low as reasonable practical, the vent sampling points will be converted to in-cabinet sampling points. The final major change was to reduce the amount of sampling holes in the hydraulic zone to cut down on the dilution factor. This zone experiences the most interference from outside factors and a balance between sensitivity and nuisance alarms had to be considered.

Even though an electric rope shovel is a very specific piece of equipment, the potential hazards and operational challenges can apply to any industrial facility or process. The deployment of an early warning ASD system in an industrial environment is almost always driven by risk management considerations and not fire codes. The high cost of equipment damage and the resulting production disruption makes object protection an important part of a risk management program. An early warning ASD system is particularly suited to object protection because the ability to route and place the sampling points right next to the area of the potential hazard. A well designed early warning ASD system can also determine normal operational particulate levels and then can be adjusted to limit the impact of what would be considered a false alarm. However, as the mine's mobile maintenance department realized during the test, a "False Alarm" can be a possible indication of an operational issue that needs to be addressed.

For more information, go to www.xtralis.com

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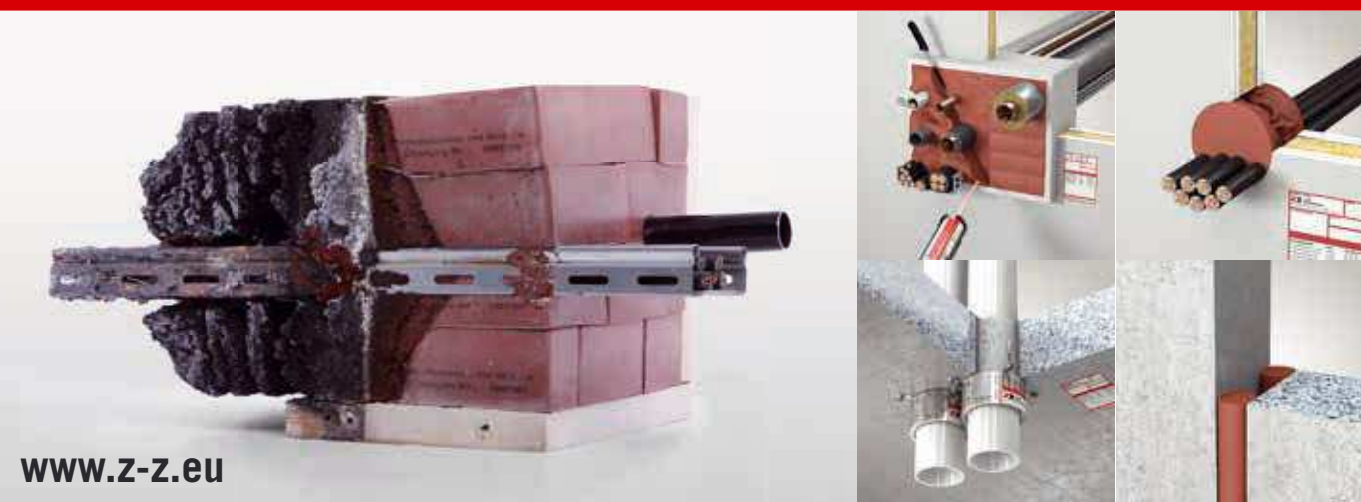
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Considerations for the application of high-temperature coatings – Part 2

Managers of petrochemical, refining, power, offshore, pulp and paper and other facilities with extensive hot processes and piping systems are frequently challenged with performing all the necessary coatings maintenance work only during periods of outages. When coatings work has to be performed on areas where elevated temperatures are involved, many think that the facility has to be shut down. This may not be the case. A question frequently posed by facility managers is, “Can I do maintenance painting work while the plant is operating?” As described below, the answer is, “Yes you can, but there are safety and health issues that must be considered”.



Michael McLampy

This is an excerpt from a white paper generated by Michael McLampy, Global Business Development Director at PPG's protective and marine coatings business. Michael has over 20 years of experience in the industry with 10 years focused primarily on coatings for elevated temperature and corrosion under insulation service. He has presented numerous white papers for many international organizations including NACE International, The Society of Protective Coatings, and the Construction Specification Institute.

Worker welfare

Application of coatings on high-temperature surfaces increases the potential for heat-related illnesses, especially where chemical- or flame-resistant clothing is worn for personnel safety. Four environmental factors affect the amount of stress a worker faces in hot work areas: temperature, humidity, radiant heat (such as from the sun) and air velocity. Personal characteristics such as acclimatization to the heat, age, weight, fitness and medical condition

also impact a given individual's potential to experience a heat-related illness.

Specific disorders resulting from heat stress include the following:

Fainting or heat syncope can occur when an un-acclimatized worker stands in the heat. Victims usually recover quickly after lying down. Moving around, rather than standing still, will usually reduce the possibility of developing heat syncope.

Heat rash or prickly heat may occur in hot environments where sweat is not easily removed from the surface of the skin by evaporation. Heat cramps are painful spasms of the muscles, which are caused when workers drink large quantities of water but fail to replace their bodies' electrolyte loss. Tired muscles, those

▼ Four environmental factors affect the amount of stress a worker faces in hot work areas: temperature, humidity, radiant heat and air velocity.



Image courtesy of PPG Industries Limited



Images courtesy of PPG Industries Limited

used for performing work, are usually the ones most susceptible to cramps. In heat exhaustion, fluid and electrolyte loss through sweating is not replaced. Though the worker will still sweat, they experience extreme weakness or fatigue, giddiness, nausea, or headache.

Heat stroke is the most serious heat disorder and is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excessive heat.

Preventing heat stress

Heat-stress related health problems can be prevented or the risk minimized by implementing some basic precautions. Control measures that should be considered include the use of cooling fans to reduce heat in hot locations.

Ventilation equipment should be approved for locations where flammable vapours are present.

Workers and their supervisors should be trained to recognize and treat heat-stress related disorders as well as control measures, such as the importance of fluid replacement. Employees should also be encouraged to maintain a healthy lifestyle including proper diet and body weight.

Inhalation hazards

Workers may also be exposed to solvent vapours during coatings application. This is especially true when solvent-borne coatings are applied to hot surfaces or in hot environments as the heat will likely increase the rate of solvent evaporation and increase the short term concentration in the air. The solvent vapours will be driven out of the coating quickly, but the vapours will also dissipate over a shorter duration as the solvents in the coating are quickly exhausted. Like all industrial coatings operations, employers should evaluate high-temperature coating tasks to determine whether steps should be taken to control respiratory hazards. The hazard determination will vary depending upon what materials may become airborne, their concentration, and their physical state.

Control methods

In general, control measures should be instituted for inhalation hazards when the occupational exposure limits for airborne hazards are likely to be exceeded during coating application. Information on occupational exposure limits can typically be found on Safety Data Sheets or Material Safety Data Sheets and applicable regulatory standards.

▲ Employers should evaluate high-temperature coating tasks to determine whether steps should be taken to control respiratory hazards.

Engineering controls such as mechanical ventilation should be used to reduce airborne concentrations of inhalation hazards to as low as feasible before relying on respiratory protection. General considerations for implementation of mechanical ventilation were addressed in the section on fire hazards. Engineering controls may not be feasible or may not be enough to reduce concentrations of airborne hazards to below occupational exposure limits when applying coatings. In this case, respiratory protection will be necessary to control worker exposures.

Burn hazards

Workers applying high-temperature coatings may come into contact with hot surfaces in the work area. Engineering controls, such as placement of insulating materials on hot surfaces, or work practices, such as lock out/tag out of hot equipment or scheduling work when hot equipment is not operational, should be considered.



Where engineering or work practice controls are not feasible, the use of protective clothing will be necessary. All areas of exposed skin that may come in contact with hot surfaces or vaporized water should be protected with properly selected work clothing. Clothing made of artificial materials, such as polyester, which are not flame-resistant should not be worn.

Surface preparation

Coatings professionals agree that the better the surface preparation the better the lifecycle of the applied coatings. Many typical surface preparation methods are practical on hot steel. These include hand- and power tool cleaning, abrasive blast cleaning, as well as high pressure water cleaning, or a combination of methods. As indicated previously, several of these methods may require a hot-work permit in hazardous areas as they may create sparks that are not acceptable in some work environments.

Use of high-pressure water may not require a hot-work permit and may be appropriate for working on hot steel. As discussed earlier, the water may turn to steam and, therefore, proper personal protective equipment will be required.

If the surface temperature of the steel is over 100°C (212°F), then the water should evaporate from the steel before there is a chance for flash rust, thus mitigating the need for any rust inhibitors that might require additional safety precautions.

Conclusions

The case can be made that coatings specifically designed for application to hot surfaces can be safely applied in hot environments, but unique safety and health issues must be considered. These include the surface temperature of the equipment being painted must be below the AIT of the coating system.

Specific hazards and control measures are in addition to those typical to any industrial maintenance painting project, any special hazards like work in confined spaces, and any standard protective measures (such as hotwork permits) used at the facility. Naturally, none of the above control practices will be effective without proper worker training and supervision.

All parties involved with the application of specialty high-temperature coatings to hot surfaces should be medically qualified, trained in necessary work practices and controls, and monitored

▲ Coatings professionals agree that the better the surface preparation the better the lifecycle of the applied coatings.

to verify consistent implementation of all control practices.

Coatings technologies allow for coating application on hot-steel surfaces but applying coatings to hot steel requires a review of safety practices and must be thoroughly planned to minimize the risk of accidents or injuries. Properly addressing the safety and health issues described above may increase application-related costs.

However, the fact that coatings work may be performed during normal operations and without the need for equipment shut-down can result in significant overall savings to the facility owner, especially when the facility normally operates 24/7 throughout the year. As such, proper application of specialty coatings to hot surfaces can be considered as a potential cost-savings tool for facility maintenance and repair.



For more information, go to
www.ppgpmc.com/Oil-Gas-Chemical.aspx



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NFPA Conference & Expo

The premier event in fire

Every year, thousands of the leading fire, electrical and building safety professionals, from around the world consider attendance at the NFPA Conference & Expo a must. The NFPA Conference & Expo is widely regarded as the most comprehensive event in the industry. Taking place at the Mandalay Bay Convention Center in Las Vegas, the event combines an unrivaled educational conference with an expo of more than 300 solution providers.

Why do they keep coming back?

They know there's no better place to be when they're looking for ways to do a better job, update their knowledge, solve a problem, save money, make more money, keep up with their competition and much more. In general, show their commitment to a very important shared mission. That mission has been the NFPA's mission for more than a hundred years; to reduce the pain, suffering and financial burden created by a fire, an explosion, or an unsafe electrical discharge.

What is the NFPA?

The NFPA is the world's leading advocate of fire prevention and an authoritative source on public safety. NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and related risks.

The NFPA publishes 300 codes and standards that influence every building, process, service, design, and installation in the U.S. and many other countries. These codes have been developed by its members and other industry stakeholders over the course of the association's 115 years of concerted effort, and are continuously refined through research, training, communication, and a robust consensus building process.

The annual event, NFPA Conference & Expo, plays a key role in developing and disseminating code information through a comprehensive technical program, and for the ever evolving consensus codes, the NFPA Technical Meeting where revisions, motions, and consent documents are presented and voted on.

Who should attend?

Professionals concerned with protecting people and property in any & all building and facility types – and anyone who shoulders responsibility in the areas of:

- Fire Prevention
- Life Safety
- Electrical Safety
- Premise Security
- Building Design & Management
- Fire & Emergency Services
- Loss Control & Risk Management

Conference Program

The 2016 conference offers more than 150 educational sessions, divided into tracks to help attendees identify sessions that best meet their professional needs. Plus, we've added two new tracks this year – Sustainability and Health Care!

- Building & Life Safety
- Codes & Standards
- Detection & Notification
- Electrical
- Emergency Preparedness/ Business Continuity
- Fire & Emergency Services
- Fire Protection Engineering
- Fire Suppression
- Health Care
- Loss Control/Prevention
- Public Education
- Research
- Sustainability

Record-setting Exhibition

Alongside the conference programming is a three day product exposition featuring the world's top suppliers. Over three hundred exhibitors will be demonstrating



the latest products, technologies and equipment for fire prevention and suppression; alarming and mass notification; system design & installation, testing, maintenance; and enhancing life safety measures.

The NFPA Technical Meeting

The NFPA Technical Meeting will be held at Mandalay Bay Convention Center in Las Vegas. The meeting will begin at 8am on Thursday, June 16th. The NFPA Technical Meeting is an important step in developing a complete record to assist the Standards Council in determining the degree of consensus achieved on proposed changes to NFPA documents. NFPA Technical Meetings are held annually at the NFPA Conference & Expo.



For more information, go to
www.nfpa.org

Coltraco Ultrasonics

Booth 1144

How do you currently test pressurised fixed gaseous fire suppression systems? Weighing? Shutting down the system, dismantling the cylinders and placing on scales? Once a year? Are your systems protected against accidental discharge or leakage?

Coltraco Ultrasonics is

a leading British designer and manufacturer of ultrasonic safety equipment. Coltraco offer a range of handheld inspection equipment and fixed continuous monitoring systems – to suit all requirements from the most technologically advanced in the world to the cheapest – for CO2, FM-200™,

NOVEC™ 1230, HFC225 & 227, FE-13™, FE-25™ & FE-36™ systems. In addition to fire safety, our technology includes airtight/watertight integrity testing, ultrasonic thickness gauging, ultrasonic flow meter, bearing indicator and more.

We have almost 30 years' experience, operating across 19 market sectors, supplying 106 countries worldwide. Coltraco also have local partners around the world who can assist you if required and provide local expertise.

We are committed to our

Safesite® mission: safety for safety's sake; aiming to supply equipment to help our customers reduce risk to life, business and facilities. Our foundation is integrity, with family values formed over three generations since 1987. Science is at our core and leads our focus on innovation across Research & Development tracks which will take the company into the future of integrated monitoring.

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FFE

Booth 1153

FFE is bringing the latest in wide-area smoke and flame detection to the NFPA Conference and Expo.

On display be the Fireray 5000 motorized, auto-aligning optical beam smoke detector, which is ideally suited to large interiors with high ceilings, enabling coverage of a large area at minimal cost. The Fireray 5000 combines an infrared transmitter and receiver in the same unit and operates by projecting a well-defined beam to a reflective prism, which

returns the beam to the receiver for analysis.

The company will also be showing its innovative new Light Cancellation Technology (LCT) for its Fireray 3000 end-to-end optical beam smoke detectors. The LCT works by actively monitoring ambient light levels on the detector and 'subtracting' them away from the 'real' signal. This allows the detector to work under the most difficult light conditions, including sunlight, sodium lamps and fluorescent lighting.

To find out more about

these technologies be sure to call past FFE's booth, where industry experts will be on hand to answer any questions you may have.

www.ffeuk.com



Firetrace

Booth 645

Firetrace offers industry leading solutions for both full room and equipment / enclosure fire protection.

The original Firetrace systems, featuring the Firetrace Detection Tubing, are the proven self-contained, self-actuating systems that are protecting more than 250,000 pieces of equipment worldwide. From bus engines to electrical panels, Firetrace can protect nearly any enclosure. Systems are available with a selection of suppression agents to deliver the best possible protection for

any hazard. The innovative E4 Novec 1230 clean agent system utilizes increased pressure to get the best performance from low pressure, low cost hardware. The increased performance translates to smaller piping requirements and the potential for larger piping networks that can feature unprecedented cylinder to nozzle capabilities in a low-pressure system.

New for 2016, Firetrace has completed its engineered systems line by offering both conventional and analog

addressable control systems. These systems utilize the latest technology in smoke detection and feature virtually unlimited flexibility in single and multi-zone applications. Now, customers can specify the complete Clean Agent Fire Suppression from one reliable source – Firetrace.

www.firetrace.co.uk

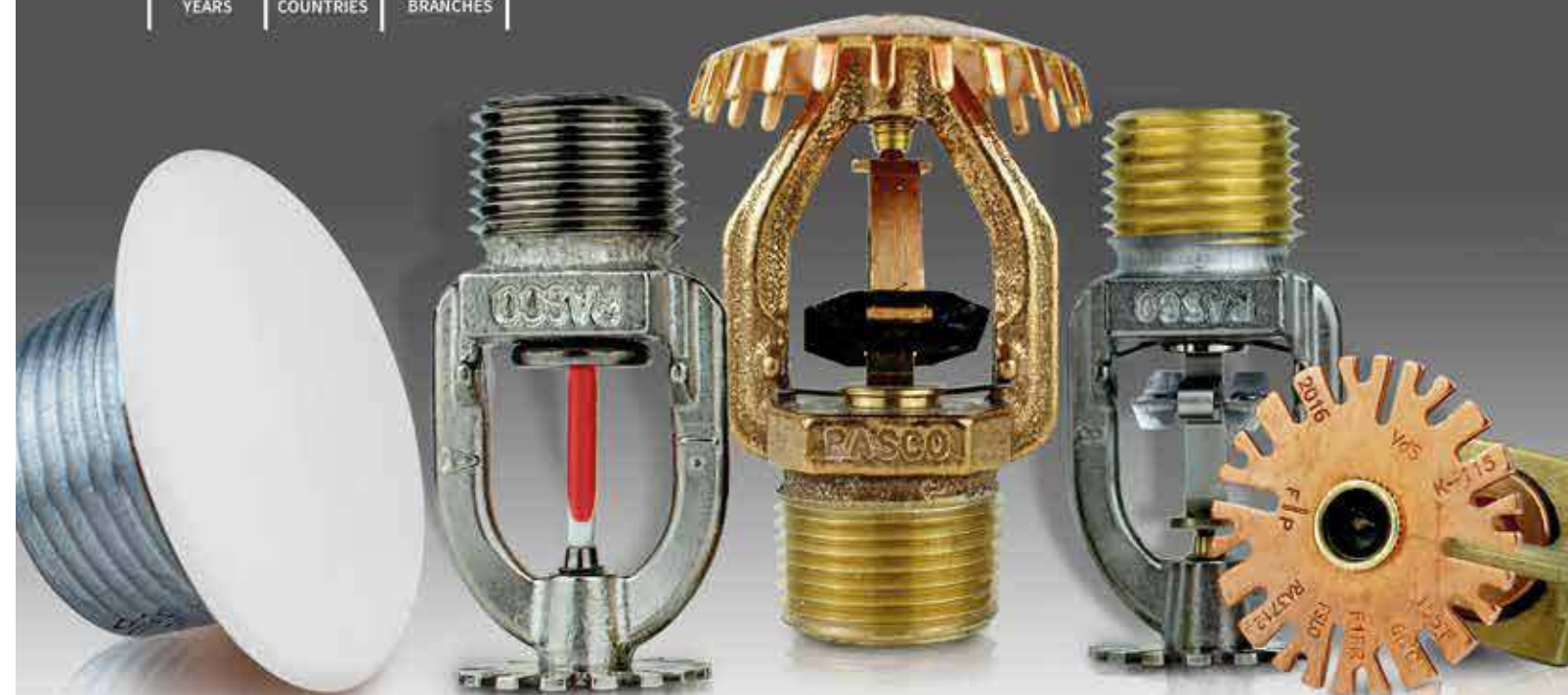


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Sign up to our monthly email blast to receive information on Reliable's latest product launch or innovative system solutions: www.reliablesprinkler.com/contact-us/eupdates.



OCV Control Valves

Booth 1126

OCV has a long history in manufacturing control valves for fire protection systems and offers a complete line of high performance listed and approved valves.

Our 74FC Series is a simple on-off deluge valve that utilizes an innovative oval design to optimize flow capacity, minimize head loss and provide accurately controlled closing and opening at all flows with drip-tight sealing.

The 74FC Series can be readily adapted to perform numerous application functions,

but three common models are the Model 216FC, Model 216-3FC and Model 216-4FC. The Model 216FC Pneumatic/Hydraulic Deluge Valve is actuated by a pneumatic pilot and commonly used in deluge spray and foam-water systems.

The 74FC Series can be installed horizontally or vertically and can be maintained inline via its top entry design for easy maintenance and troubleshooting.

The Model 216-3FC Pneumatic/Electric/Hydraulic Deluge Valve is operated via a

pneumatic pilot and a solenoid pilot. The 216-3FC is commonly used in offshore platforms and transportation tunnels. The 216-4FC is actuated by a solenoid pilot and commonly used in manufacturing and power plants.

Our quality system is registered to ISO 9001 and the 74FC Series is UL Listed for deluge service in globe pattern for sizes 3" through 10" as well as being an ABS Type Approved Product.

www.controlvalves.com



Pentair

Booth 811

Pentair, under the brands Aurora and Fairbanks Nijhuis, is a global leader in fire protection for commercial buildings and industrial facilities. From split case, inline, end suction and vertical turbine pumps to positive displacement pumps for foam and water mist applications, Pentair's pumps are designed per NFPA and UL-listed/FM Approved. For



harsh environments including offshore and near-shore applications, pumps are available in stainless steel, duplex, super duplex and nickel aluminum bronze for superior reliability. All Pentair pumps are built to the highest quality standards and tested to ensure optimal performance. The broad range of Pentair's pump performance allows for maximum design flexibility while minimizing floor space requirements and cost.

Pentair has a worldwide footprint in fire protection with

a global network of distributors with expertise in fire protection. Supporting regional markets with Listed and Approved products, Pentair has opened manufacturing facilities in UAE and China, and expanded the capabilities of its facility in The Netherlands. These localized manufacturing sites and resident fire protection experts means Pentair can provide UL/FM product with short lead times and system configurations customized to applications for the region.

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UL/FM fire pumps, Pentair designs and builds custom fire pump systems based on a century of experience in fire protection. Recognizing that a quality pump system is far more than the sum of its components, Pentair brings a breadth of engineering, manufacturing, and project management expertise from its facilities worldwide to provide a fire pump package that is fully compliant and meets – or exceeds – the customer's expectations.

www.pentair.com

STI (Europe) Ltd

Booth 911

STI manufacture an extensive and unique range of fire, safety and security products, many

of which will be on display at NFPA. Within the range is an audible polycarbonate



Safety Technology International (Europe) Ltd

protective cover designed to retrofit over manual call points, which is globally recognised by authorities as an essential fire system component on sites where the risk of false alarms is high, for example education, health care and housing.

The polycarbonate range also includes weatherproof enclosures. An ideal solution to extend the life and reliability of call points and switches exposed to harsh conditions such as factory wash down areas.

Also within the Stopper Line are alarm devices for fire extinguishers and fire doors as well as a comprehensive range of protective anti-vandal cages, resettable call points, push buttons and key switches.

In addition, STI's Wireless Alert Series has been combined with the unique features of the Exit and Extinguisher Stopper®, monitoring fire doors and extinguishers 24/7, improving the fire safety of buildings and their occupants.

www.sti-europe.com

Solberg

Booth 723

Solberg is your one-stop resource for high performance, sustainable firefighting foam concentrates and custom-designed foam suppression systems hardware. Solberg has the expertise, capabilities and resources to serve the high-hazard, high-risk market sector.



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ARCTIC™ AFFF, C6 compliant foam concentrates are intended for use on Class B hydrocarbon fuel fires and are available in 1%, 3% and

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FIRE-BRAKE™ foam concentrate is a synthetic firefighting foam concentrate specially designed to be used for wildland, structural and other Class A fuel fires. The foam concentrate is biodegradable and non-toxic, so it is environmentally sustainable. FIRE-BRAKE foam concentrate

is proportioned at a rate of 0.1% – 1.0%.

SOLBERG brand foam suppression systems hardware is engineered by a team with over 225 years of combined in-the-field fire protection experience. As a custom manufacturer, we tailor firefighting hardware to meet your particular specifications. You can count on us to work with you and deliver products that perform as needed, when you need them.

www.solbergfoam.com

Spectrex Inc.

Booth 1125

Spectrex Inc. is a technology leader in optical Flame and Open Path Gas Detection (OPGD). Spectrex developed and patented industrial optical IR3 Flame Detector and Xenon Flash OPGD detectors, designs are now standard for Oil & Gas projects. A wide range of flame detectors types are available, from ultra fast (msec) detectors to high sensitivity



hydrocarbon and hydrogen flame detectors, alongside the equally large range of OPGD that can detect hazardous gases, from flammable hydrocarbons to toxic Ammonia and H2S. All Spectrex products are approved and certified to meet relevant third-party Ex hazardous area, performance and reliability approvals for the wide range of application challenges, worldwide.

The SharpEye 40/40 Optical Flame Detector Series offers a variety of accurate, explosion proof detection

technologies for flame detection at distances up to 215ft (65m), including the renowned IR3 detector, multi IR, UV/IR, UV and single IR detectors. The range has recently been enhanced with a new Ultra Fast UV/IR detector which provides detection in 2msec. Other more compact and commercial models are also available, including the low cost MPI model.

The SafeEye Open Path Gas Detector Series includes relatively lightweight detectors able to detect at long distances

with high immunity to spurious alarms. Hydrocarbon gases can be detected by the Quasar 900 Series over an open path of up to 660ft (200m), and have recently been joined by the Quasar 950/960 detectors able to detect toxic gases such as ammonia and H2S over paths of up to 200ft (60m). Also available are Duct Mounted OPGD detectors, providing fast protection within turbine or air intake ducts.

www.spectrex-inc.com

TLX Technologies

Booth 250

TLX Technologies will introduce our next generation supervised fire suppression actuator at the NFPA Expo in Las Vegas. This new revision of TLX's actuator meets required UL and NFPA wiring codes and standards and includes an internal supervisory mechanism that ensures the actuator is properly installed on the discharge valve of the extinguishing agent storage container. Integration of the supervision mechanism eliminates the need for any additional components,

connections and wire paths; resulting in a streamlined, NFPA compliant solution.

The supervised latching solenoid actuator comes standard with six wires. Two wires are used for activation and four are used for supervision of both the actuator placement as well as connection to the fire panel. Factory-wired leads fed through an integrated conduit port in the housing have been added to meet the UL and NFPA wire codes required on all fire suppression actuators.

TLX's actuator is a recognized component to UL 864 and meets the requirements of NFPA 2001 (Sec. 4.3.4.1), UL 2166, UL 2127 and FM 5600. The supervision on the actuator allows for fully engaged installation detection to be configured to your exact needs. Rugged construction, ultra-fast response and the ability to be reset ensures reliable and outstanding performance over the actuator's entire 15-year life span.

For over 15 years, TLX Technologies has worked with

manufacturers to develop and manufacture custom actuators and valves to meet the challenging demands of active fire suppression systems.

www.tlxtech.com



Tornatech

Booth 1217

Based in Montreal, Canada since 1985, Tornatech specializes in the conception and manufacturing of fire pump controllers in accordance with the NFPA 20 standard. They are UL listed and FM approved. Our products have proven to be reliable property loss equipment in many mechanical rooms worldwide.



As the first manufacturer of fire pump controllers to incorporate touchscreen technology, we are pleased to announce the release of the ViZiTouch V2 color touchscreen operator interface.

The new 7.0 inch color touchscreen eliminates pushbuttons, lights and several of the membrane key switches found on previous models of diesel and electric fire pump controllers.

The large screen allows expanded icons and clearer graphics to be displayed,

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Construction features include compact enclosure design and unique definite purpose disconnecting means, emergency start handle and mechanism.

We are committed to delivering innovative products, the best technical solutions, superior quality and outstanding service. Our engineering team

is continuously keeping up to date with the latest technologies available and developing tools for the future.

We have developed a network of subsidiaries, sales offices and authorized service dealers located around the world.

With manufacturing capabilities in Canada, Europe and Dubai, a sales office in Asia as well as sales representatives in the U.S.A., we are truly a worldwide reference in Fire Pump Controllers.

www.tornatech.com

UL

Booth 935

UL is a premier global independent safety science company with over 120 years of expertise in verification, testing and certification. It has more

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Delivering market access



solutions for Europe, the Middle East and the Americas, UL offers the highest level of regulatory acceptance market recognition for the building and life safety technology sectors which include security, fire suppression, personal protection equipment and more. UL works with manufacturers, designers, architects, trade associations and international regulatory authorities to bring solutions to a complex global supply chain.

UL utilizes research and standards to continually meet

ever-evolving safety needs, as well as to cultivate new certification programs and aid in the development of critical codes that will address emerging risks and innovation within the life safety and security industry.

We offer technical engineering support services, factory capability assessments, quality assurance, regulatory compliance testing, and sustainability and environmental certifications.

www.UL.com

Victaulic

Booth 1311

Designed for fire protection systems, Victaulic's new FireLock® Installation-Ready™ fittings, a single-unit design solution, provide fast and easy pipe connections with no need to disassemble the coupling during installation. Standard grooved pipe and accessories are easily joined by pushing the elbow onto the pipe and tightening three bolts, versus four; installing in less than

half the time of conventional fittings. With fewer steps contractors can optimize crew sizes and better manage labor while delivering consistently faster, reliable pipe joints.

Victaulic FireLock Installation-Ready Fittings are available in 1 1/4 - 2 1/2 inch/32-65 mm and 76.1 mm sizes.

www.firelockfittings.com



Talentum Dual & Triple IR Flame Detectors

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Talentum IR units detect flames from all fuels, including hydrogen gas.
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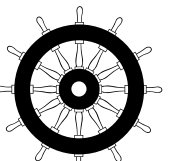
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Effective fire detection solutions for hazardous environments

By their very nature, hazardous environments require a highly considered approach to fire detection. Apollo Fire Detector's Senior Product Support Engineer, Warren Moyle, discusses meeting the challenges of protecting such environments.



Warren Moyle

A risky environment

There are a variety of different hazardous environments where providing effective fire detection solutions to protect people, facilities and the environment can be both complex and challenging. These include the marine, offshore and industrial sectors, where high risk environments – often coupled with vast site sizes and large numbers of personnel – mean that even a small fire incident could quickly develop into a major disaster.

An example of this can be seen in the 2010 Deepwater Horizon explosion in the Gulf of Mexico. The explosion had devastating consequences, resulting in the deaths of 11 offshore workers, and causing the largest offshore oil spill in American history.

This incident highlights the challenges of providing fire detection solutions in volatile and hazardous settings, and emphasises the need for the industry to ensure the correct protection is in place.

The intrinsically safe solution

For many hazardous industries, companies may be required to install intrinsically safe (I.S.) approved devices as part of their fire detection systems. In a nutshell, an I.S. system is an extra level of protection against fire and is defined as one that 'comprises apparatus and interconnecting wiring in which any spark or thermal effect in any part of the system intended for use in hazardous areas is incapable of causing ignition'.

I.S. systems have a broad range of application uses, most often including locations where an explosive mixture of air and gas or vapour is, or may be, present continuously, intermittently or as a result of an accident. These are defined as hazardous areas by the BS EN 60079 series of standards, the codes of practice for installation and maintenance

of electrical apparatus in potentially explosive atmospheres. These hazardous areas are most commonly found in petroleum and chemical engineering plants, offshore oil and gas platforms and in factories that process and store gases, solvents, paints and other volatile substances.

The design of electrical equipment for these areas needs to be carefully considered to avoid the ignition of an explosive mixture, not just in normal operation, but also in fault conditions. There are a number of approaches available to ensure that electrical equipment will not ignite under these conditions, including oil immersion, pressurised apparatus and powder filling.

The two most common methods in current use are flameproof enclosures and I.S. systems. As the name suggests, flameproof enclosures contain their equipment within a box so strong that an internal explosion will neither damage the box, or be transmitted outside the box. The surface must remain cool enough not to ignite the explosive mixture and when flameproof equipment is interconnected, flameproof wiring must be used. This method is most valuable when high power levels are unavoidable, but it is not permitted for areas where an explosive gas-air mixture may be present for long periods. Under these conditions, I.S. systems are the only approved protection method.

The basic principle of I.S. equipment is that it limits stored electrical energy and surface temperature by restricting both current and voltage, operating at such low power and with such small amounts of stored energy that it is incapable of causing ignition.

At Apollo we offer both addressable and non-addressable solutions for I.S. areas, with both methods requiring

► Apollo's intrinsically safe heat detector for challenging environments.

the use of a galvanic barrier before the hazardous area. This barrier limits the voltage and current – including any large power surges (which could result in devices sparking or over-heating) from entering the hazardous area. Generally, the recommended barrier type is galvanically isolated – this type of barrier enables safe wiring and installation without the added complications of earth screens being required.

A further required component in an addressable system is the protocol translator. This device is invisible to the control panel, but allows addressable devices within a hazardous area to communicate with the control panel even with much lower voltage and currents. Additionally, the wiring on an addressable system is manufactured in zonal circuits from the main loop. The scheme drawings for I.S. systems show spurs or radials of wiring into the hazardous area, but not looping back out again due to the system certification.

I.S. fire detection solutions are regularly specified for power generation plants, which carry a significant risk of explosion. Typical applications that Apollo has worked on include conventional and nuclear power stations, hydroelectric power, electric-switching and distribution stations. In the marine, oil and industrial sectors, Apollo has provided a range of analogue addressable and conventional I.S. solutions for cargo ships, passenger ships, ferries and military vessels, as well as offshore facilities.

Explaining I.S. legislation

With the potentially dangerous environments found in the marine, oil and industrial sectors posing such high risks, it is understandable that the emphasis placed on meeting strict health and safety standards is so high.

I.S. technology was first introduced into fire detection equipment in the early 1980s, but it was not until July 2003 and the introduction of the ATEX (Atmosphere Explosive Directive), that the use of I.S. equipment for certain hazardous environments became compulsory.

The ATEX Directive consists of two EU directives – one for the user of the equipment and one for the manufacturer.



Image courtesy of Apollo Fire Detectors

The first is the Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres. The second is the Directive 2014/34/EU concerning equipment and protective systems intended for use in potentially explosive atmospheres.

The ATEX Directive is applicable to all equipment intended for use in explosive atmospheres (zoned areas), whether electrical or mechanical and including protective systems. It applies to a large range of equipment found in environments including fixed offshore platforms, petrochemical plants, mines, flour mills and other areas which carry the risk of a potentially explosive atmosphere.

Under the ATEX Directive, system owners are required to classify the areas where hazardous explosive atmospheres may occur into zones. Within these hazardous areas, three zones are identified:

- Zone 0 – Category 1 – where an explosive gas-air mixture is continuously present or present for long periods.
- Zone 1 – Category 2 – where an explosive gas-air mixture is likely to occur in normal operation.
- Zone 2 – Category 3 – where an explosive gas-air mixture is not likely to occur in normal operation and, if it occurs, it will exist only for a short time.

Any electrical equipment located within these areas – such as sockets, lighting and computers – must be designed to be incapable of igniting any explosive mixtures, both in normal operation and also in a fault condition. Flameproof devices can be used in Zones 1 and 2 – areas where there is an intermittent danger or an accidental spillage – however, where there is a constant mixture of explosive gases or chemicals (Zone 0), I.S. equipment is the only permitted method.

Warren Moyle has worked for Apollo Fire Detectors since 1998. In his current role of Senior Product Support Engineer, he is continually supporting Apollo's customers with specifying, testing and installing all of Apollo's product range.



Image courtesy of Apollo Fire Detectors

◀ **Passing the smoke test**
– Apollo's Orbis IS optical detector.

- Unarmoured cable – the system is electrically protected instead of being mechanically protected.
- Safe for personnel – it uses extra low voltages and currents.
- Safest technique – it is the only technique permitted for use in Zone 0.

Fully tested and certified

Given the volatile nature of the industries within which I.S. fire detection is installed, testing is a crucial part of the manufacturing process. At Apollo, we are dedicated to ensuring the safety of our I.S. technology, with all equipment rigorously tested in our Electro-Magnetic Capability (EMC) and fire test laboratories. Our production process protocol adds an extra level of confidence, requiring that all I.S. devices are tested at every stage and signed off by an approved operator.

As well as in-house testing, products used in I.S. settings also require approval by the industry authorities within the countries in which they will be used. Apollo's I.S. products have, for example, received approval from BASEEFA – a British certification body for equipment intended for use in potentially explosive atmospheres.

I.S. systems and the future

The global demand for I.S. fire detection technology is predicted to continue to rise over the coming years in countries such as Russia and China with their ongoing investment in petrochemical plants, and in the UK where the offshore industry remains a significant user of I.S. equipment.

We're well-placed to deal with this rise. Through innovative design and stringent testing procedures we're confident that we can continue to meet evolving technologies and legislation within both the fire detection industry itself and the hazardous environments which we protect. The complex and challenging nature of fire detection is never more apparent than when we're dealing with industries which carry potentially catastrophic risks, but we're committed to working closely with specifiers and installers to ensure the best in protection.

➔ **For more information, go to**
www.apollo-fire.co.uk

The benefits of I.S. technology

In addition to providing reliable fire detection solutions, using I.S. technology in hazardous situations delivers a number of benefits, including:

- Least expensive – there is no requirement for lockable fused isolators, protected cable or special glands.
- Simple apparatus – it permits the use of normal industrial devices if they are non-energy storing.
- Fault tolerant – it is the only technique that stays safe after faults develop in cables and fallible components.
- Live maintenance – it is the only technique that permits live working without gas clearance certificates.

The global demand for I.S. fire detection technology is predicted to continue to rise over the coming years in countries such as Russia and China with their ongoing investment in petrochemical plants, and in the UK where the offshore industry remains a significant user of I.S. equipment.

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With over 35 years global fire detection experience in the design and manufacture of innovative fire detection devices, Apollo Fire Detectors are committed to producing trusted and reliable products.

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Boundary protection

With a new Fire Code due for imminent release in the UAE and high rise building owners expecting increased regulation on external curtain walling and cladding for new buildings, Coopers Fire explains how fire curtain barrier systems may be used to provide boundary protection to both new and existing buildings.



Mike Ward

Four major fires in tall buildings in the UAE over the last four years have focused attention on the potential for external fire spread via non-fire-rated building facades. The most recent fire in a residential tower in the Ajman emirate, north of Dubai, on Monday 28 March, is reported to have spread from one building to an adjacent block. The Address Downtown at the turn of the New Year saw rapid fire spread via the external facade, with the building quickly evacuated. Similarly, the Torch fire in February 2015 resulted in severe damage to over 100 flats and in 2012, the Tamweel tower was gutted by a blaze that saw hundreds of residents evacuated.

A new Fire and Life Safety Code of Practice, due to be released in

April 2016, is expected to address many of the issues relating to new buildings, placing more requirements on curtain walling and cladding products and introducing a comprehensive list of tests that must be conducted. Manufacturers selling building materials not approved by Civil Defence will be subject to prosecution and there is also likely to be a general requirement introduced for all building products and systems to be independently tested, audited and certified by approved third-party bodies.

However, there still remain concerns about buildings that predate 2012, when the problem was first identified and additional requirements introduced. The UAE's Dubai Civil Defence (DCD) is reportedly planning a review of all buildings in the country in a bid to gauge the fire safety risk they pose, with some commentators suggesting that at least 20% of UAE building stock may be affected.

▼ Tall buildings
at Dubai Marina.



Mike Ward is Sales Director,
Coopers Fire Ltd.



Images courtesy of Coopers Fire Ltd.



▲ Boundary protection fire curtains over windows at Dover Street, London.

◀ Fire curtains have an important role to play both in upgrading existing buildings and protecting new projects.

Improving tall building safety

Refurbishment of many of these existing buildings will be encouraged by the new Fire Code, which is also expected to place new responsibilities on building owners to maintain the life safety measures within their buildings. The Code will require building owners to renew a no-objection certificate annually, following inspections by Civil Defence to ensure modifications are 'fire-safe'. However, in certain situations, glazing façade systems such as curtain walling may be too expensive to upgrade, or incapable of being upgraded to meet the environmental requirements.

Coopers Fire suggests that fire barrier curtains have an important role to play both in upgrading these existing buildings

retrospectively to improve life safety as well as in protecting new projects at the point of design or construction. The company has developed a range of fire barrier curtains to meet the specific needs of boundary protection, providing architects and engineers with an approved alternative to fire shutters, fire-rated glazing and firewalls, whilst protecting windows from fire.

Fire curtains offer a practical solution where notional boundaries are infringed due to new building proximity to existing buildings or sheer building density. They can also assist in preventing vertical fire spread from floor to floor, which potentially could compromise horizontal evacuation.

Such systems comprise technologically advanced fire and smoke-resistant fabric barriers encased in a compact steel housing. The fire curtain barriers remain invisibly retracted until activated by an alarm or detector signal, at which time they descend safely to their operational position, controlled by a fail-safe by gravity system to stop and control the spread of fire and/or smoke in or around a building.

All of the vertical Fire Barrier Curtains offered by Coopers Fire can offer boundary protection and are a perfect solution to prevent the spread of fire in tall buildings.

Coopers' FireMaster Plus fire barrier system can be installed on windows to prevent the fire from entering the building from the outside, spreading from one building to the next or from the inside to the fascia on the outside or to nearby buildings in close proximity. The FireMaster Plus² offers 180 minutes of integrity (E) and 60 minutes of radiance (EW).

Coopers' ViiFire fire curtain offers a compact head box in sizes up to 3m wide with a 3m drop. It provides protection for openings, boundary protection and cross corridor separation.

Coopers' Vertical FireMaster offers integrity (E) for up to 120 minutes and 30 minutes of radiance (EW), and is available in unlimited widths and up to 8m drops.

Coopers Fire has installed boundary protection fire curtains in two iconic buildings in London, where there is a high density of tall buildings; Dover Street and the Leadenhall Building ("The Cheesegrater"). At Dover Street, fire curtains provide protection to an existing building where non-rated glazing was chosen to protect the notional boundary but there were plans to extend the height of an opposite building.

Coopers Fire Limited is a British company with a long and successful history of producing fire and smoke curtain barrier systems for installation worldwide. Every Coopers' fire curtain is third party accredited to BS, EN and UL standards, and the business is certified to ISO 9001 Quality Management and ISO 14001 Environment Management. In addition, Coopers Fire is the only fire and smoke curtain manufacturer with independent third party accreditation for the installation, commissioning and servicing of fire and smoke curtains.

For more information, go to www.coopersfire.com



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Protecting our history from fire, by learning from the past

Put simply, fire is probably the single most obvious common threat to the fabric and contents of sites that represent our cultural heritage. We all hope to learn from the historical buildings and museums that are all around us and much effort goes into conserving them. However, one thing that life has taught us is that while a fire in an ordinary building might sometimes cost a great deal of money to rectify, the loss of irreplaceable works of art or the damage to historically significant sites are things that often cannot be put right.



Markus Späni

Markus Späni is working as Application Manager in fire protection at Siemens Building Technologies in Switzerland where he has lead and coordinated the international Application Network for Fire Protection for more than 15 years. In his role, he is responsible for collecting, gathering and spreading application knowledge in fire safety. Due to his professional knowledge and experience in the fire safety business he is the key person regarding solution finding for special applications. In addition to his responsibility for producing different application guidelines, Markus is the principal author of the Siemens Fire Safety Guide which is used as a reference book in the market and also as educational literature in universities.

As the current custodians of these historic buildings, artifacts and all the works of art contained within our galleries, museums, stately homes, churches, castles and palaces, it is our duty to take care of them so that they can be enjoyed by generations to come. Of course, there are many aspects to providing adequate protection but we must surely give a particularly high priority to safeguarding them from fire.

Often it is the building or site itself that is of notable, historical significance. Perhaps an important event took place

there that changed the course of history and the lives of local people forever. Or perhaps the building shows the way of life of times gone by – the architecture, the building methods, the quality of the craftsmanship. In instances such as these, it is the protection of the building itself that is of prime concern. In other cases, such as our municipal galleries and museums, it is the many paintings, sculptures, artifacts and objets d'art that must be defended against the ravages of smoke and flame. Often it is both. However, one factor which is more important than all of these considerations when it comes to installing the most suitable fire protection systems possible – the protection of human life.

▼ Tettngang Castle relies on a wireless fire alarm system.



Human life is always the first priority

With so many visitors and staff regularly upon the premises of historical buildings, museums and galleries, it is naturally the duty of the buildings' owners and management to provide the best possible around-the-clock fire protection for the site and the people using it. It is vital to minimize the likelihood of fire by the elimination of major risks and careful management of those risks that cannot be eliminated. This usually involves the implementation of not only the appropriate infrastructure of fire detection, alarming, evacuation and extinguishing systems, but also the requisite management of staff training, fire drills, as well as the strict adherence to maintenance schedules and the observing of all fire-safety regulations.

Recently designed and constructed museums and galleries – like all modern buildings – should be designed to comply with all current national legislation in order to provide the maximum protection of all their occupants against fire at all times of night and day. In the event of a fire, all the people within the building should be alerted to the danger and able to quickly and calmly exit the premises through a clear, well planned and safe exit route. These modern galleries and museums will be designed with compartmentalization to contain any spreading of fire. They will also probably feature: state-of-the-art fire detection and alarming equipment: smoke control ventilation; multiple, well signposted emergency exit routes; and extinguishing systems appropriate to the objects that are being protected.

However, it is generally estimated that less than 20% of galleries and museums around the world are this kind of modern building. Many works of art and items of historical, artistic or natural significance are usually housed in older civic buildings or institutions and these older buildings are naturally made with the traditional, easily combustible materials in common use at the time of their construction. Adapting existing older buildings to provide such comprehensive cover is often a difficult undertaking.

The challenges

The potential impact of fire on items and sites of historic importance is, ironically, not a new thing. Loss of historically significant documents and artifacts has happened

throughout recorded time – ever since the fire which reputedly destroyed the Library of Alexandria, one of the largest and most significant libraries of the ancient world. More recently many fires such as those at the Quebec Armory in Canada and Windsor Castle in England – the largest inhabited castle in the world and one of the official residences of the British monarch – have caused major damage to the buildings and the artifacts they housed.

Often, the electrical systems within historical buildings do not comply with today's safety standards and consequently are an inherent danger themselves, but sometimes it is simply the negligent and careless use of electrical equipment and appliances that can be shown to be the cause of many outbreaks. This includes heating equipment, spotlights, hot-plates, toasters and coffee-makers left switched on, or welding, soldering or brazing work taking place during renovation projects. The spread of any resulting fire and the extent of the damage caused are often exacerbated by the traditional construction methods and standards relevant to the period in which the building was constructed. Adverse factors facilitating the spread of smoke and flames might include: open and ill-fitting doors; thin walls; structural discontinuities; unknown wall and floor voids; unstopped ventilation and service routes; undivided roof voids and the general lack of compartmentalization.

Providing protection of people and cultural assets

Providing optimal fire protection for both the people and the property itself is often at odds with the conservationist ideals of minimal intervention regarding the structure and aesthetics of any building of historic importance. The challenge for providers of fire protection is to find the balance between safeguarding life and maintaining the historical authenticity of the site. The need to preserve the aesthetic look and feel of the site is a challenge in itself. Retaining the integrity of irreplaceable interior architectural details such as wall decorations, stucco ceilings and frescoes, is vital. Finding the optimum solution is the key to providing an effective fire safety concept for each building.

Museums and galleries often have large exhibition rooms with high ceilings. In these instances, the deceptive phenomena that sometimes occur in other locations – such

as steam, dust or smoke from sources other than a fire – are generally unlikely to be present. But the large volumes of air in these rooms will cause the concentration of any genuine fire-related aerosol to be greatly diluted and more difficult to detect as a result. Such a situation calls for a proactive detection system with high sensitivity – a term which perfectly sums up ASD (Aspirating Smoke Detection) technology. ASD systems ensure reliable fire detection in demanding application areas and, combined with innovative extinguishing systems that cause no damage to the priceless, irreplaceable, sensitive items being protected, are often the ideal solution.

Being very sensitive to the lowest concentrations of smoke, ASD provides the earliest possible detection of the outbreak of fire. It works by drawing air to be sampled in a detection chamber through a large number of small holes in a network of concealed pipework that can be made practically invisible to the naked eye. In highly ornate locations, such as the artistically decorated ceilings and walls of churches, cathedrals, theatres and libraries, ASD can provide what is effectively invisible fire detection with the pipework hidden in roof voids to detect smoke early and reliably, well before active flaming breaks out. In this type of application, characterized by high ceilings and large open areas, smoke stratification will occur, mainly because smoke from a small fire lacks the heat and subsequently the thermal buoyancy to reach mounted beam type or conventional detectors located high on the ceiling. ASD uses innovative optical dual wavelength technology to detect the earliest signs of combustion, whilst ensuring good immunity to those deceptive phenomena. Doing so enables detection of smaller airborne particles as produced in the earliest stages of overheating or as found in open fires. By determining the size and concentration of the airborne particles, aspirating smoke detectors are able to differentiate between smoke and dust and steam particles. As a result, they offer the highest detection reliability, preventing the downtime and loss of income caused by false alarms. To meet the requirements of challenging environments, the detectors have a programmable sensitivity range so that not even the most demanding conditions will provoke a false alarm.

The main priority in some historical buildings however, is often the need to

minimize the impact of the detection system on the decor, aesthetics and the structure of the building, both during the initial installation work and during any subsequent maintenance. Where ASD would therefore prove unsuitable, other intelligent solutions need to be considered – such as a combination of wireless and linear smoke detectors – which is specifically suited to the needs of protecting buildings and items of historical or cultural value.

Maximum protection with wireless technology

Needing no cable, radio fire detection is the ideal solution for rooms or buildings with aesthetic or architectural restrictions as well as temporary installations. As the technology is wireless, devices can be quickly positioned and repositioned. This facilitates planning, reduces the costs of installation and offers a high level of freedom and flexibility should room or building usage change at any time. Solutions are available which use mesh

▼ The ASD pipework can be made practically invisible, therefore it can be also used for artistically decorated ceilings.

technology, along with detectors to eliminate false alarms and still provide early detection. Mesh technology is especially helpful in overcoming obstacles like the very thick walls which are typical of historical buildings or when setting up large wireless networks

Detectors with two optical and two heat sensors are more reliable than conventional wireless smoke detectors. The capacity to adapt to the appropriate environmental conditions is also important – from ‘Clean’ to ‘Harsh’, for example – by choosing an application-specific parameter set. Technology can interpret and evaluate signals in real time, dynamically adapting the selected parameters. This means the detector is immune to those deceptive phenomena such as steam, dust or even the special effects sometimes used in theaters.

Such a wireless fire alarm system has recently been installed to protect and preserve the historically valuable interior of Tettwang Castle, the stately residence of the Counts of Montfort-Tettwang in Germany’s Upper Swabia region, filled with impressive art and stuccowork from the 18th century. The Castle features spectacular Baroque interiors which are still among the finest in the region. Thanks to the intelligent and safe wireless

technology, the original building structure remained untouched and the solution was installed quickly without interfering with the museum’s opening hours.

Alarming and evacuation measures

If a fire should break out, it is essential that all staff and visitors are promptly and efficiently made aware of the fact. Visitors to historical sites, galleries, museums and other buildings of historical or cultural interest, will often include families and older, less mobile people who must all be evacuated safely and effectively in order to protect lives. These types of attraction will often have many hundreds of visitors and must usually fulfill special requirements with regard to alarming and evacuation in the event of a fire. Those places with such large numbers of visitors will need bells and alarms with a higher noise level but should also be equipped with optical alarms or beacons and sounders for the hard of hearing and partially sighted. The obvious purpose of the acoustic and visual alarms is to warn both visitors and staff of the hazardous situation that is potentially developing. It also signals the need for trained staff to take their place in order to coordinate the evacuation and help all visitors who are probably unaware of the planned escape routes and emergency exits, to exit the building safely. In some cases, the alarm will also call some specially trained staff to investigate the cause of the alarm and possibly tackle the fire with the appropriate hand-held extinguishers if they can do so without endangering themselves and others. Alarms intended for in-house staff should always be generated without delay in order to allow the cause of the alarm to be investigated as quickly as possible. Members of staff may be alerted without activating the main alarm to investigate whether the fire is small enough to be tackled without disruption to visitors and normal business activities unless absolutely necessary. Staff may be contacted by pager, mobile phone, the app on a smart phone, a local, discreet audible alarm or even a silent or coded alarm.

At the very least, a basic system will activate the installed alarms and transmit a signal to the local fire department and emergency services. More sophisticated solutions may include a dedicated voice alarm system providing clear and concise information through calm, pre-recorded vocal messages to assist a speedy evacuation and to prevent panic.

Extinguishing

Whatever systems or solutions are put in place, with so much activity taking place on the premises of historical buildings, galleries and museums – involving not only visitors but also catering, electrical repair and maintenance staff – the possibility of a fire gaining hold will always be present. The high fire load of these buildings, along with the difficulties of ensuring effective compartmentalization, means that a fire can soon gain hold if it is not stopped in its early stages. The provision of an adequate number of hand-held extinguishers in the appropriate areas to be operated by staff or competent visitors in the earliest stages of an outbreak is essential. Intervention by municipal firefighting forces might prevent the total destruction of the building itself but the amount of water used from high-pressure hoses during the rescue process sometimes results in as much water damage to important artifacts and works of art as that caused by the fire and smoke. The installation of an automatic extinguishing system is the obvious answer to this problem but so many sites of historical and cultural interest simply have not taken this important step.

There are, of course, various different forms of automatic extinguishing solutions, the suitability of which largely depends on the application itself. In general exhibition areas, water sprinkler systems and water mist systems are mostly used for their effectiveness, high reliability, their simple and robust technology, low maintenance costs and the usual plentiful supply of water. The use of sprinkler systems is primarily intended to protect the fabric of the buildings and prevent their collapse. The sprinklers can effectively suppress and extinguish fires in the early stages of combustion, but their main purpose is to control the fire and cool the building structure in order to allow firefighters to tackle any real blaze by reducing smoke and dangerous gases and lowering the internal temperature. However, the installation of sprinkler systems, common in modern buildings and often required by local building regulations in many countries, can substantially reduce the insurance premiums for many premises. However, this is often frowned upon in historical buildings and museums by conservationists. The installation procedure can be quite invasive and should only be undertaken where architectural or interior decor sensitivity is not an issue.



Image courtesy of Siemens

In archive rooms and closed storage vaults where historic or artistic items are housed, gas systems or those using a combination of inert gas and water are widely employed. Inert gas systems are particularly suitable for rooms that contain sensitive objects or equipment where water cannot be used. However, an alarm must be sounded before the release of the extinguishing gases – which suffocate the fire by depriving it of the oxygen needed for combustion – to alert people of the imminent flooding of the area. Unique systems using a combination of gas and water admix release nitrogen gas to reduce the concentration of oxygen in a room and effectively extinguish detected fires, rapidly and reliably. The release of water admix cools the combustible materials to prevent re-ignition and also serves to provide a smoke scrubbing function, thus reducing the health hazard facing people as they re-enter the room.

An intelligent approach to fire safety in historical buildings and museums

The protection of historical buildings, galleries, museums, theatres, libraries and other buildings of cultural interest from fire is unlike that required by most other types of building. They generally comprise many different types of room: large display rooms with high ceilings; archive rooms and storage vaults housing different types of important objects and documents; electrical plant rooms in which power supply equipment, control systems, security systems and computer servers are accommodated; kitchens that cater for large numbers of visitors and staff daily

▲ Linear smoke detectors were installed in parts of the Polish Maritime Museum in Gdansk.

represent a potential fire hazard; special function rooms used for receptions, parties, weddings and conferences. These areas can all be considered as relatively critical zones due to the difficulties in detecting the early stages of combustion or the variety of ignition sources. Simple compliance with the relevant minimum legislation does not always provide comprehensive protection from the damaging effects of fire, smoke – and the high-pressure water used by firefighters to suppress their spread – especially in terms of protecting the valuable assets and irreplaceable historic artifacts and works of art.

The Polish Maritime Museum in Gdansk, the largest museum of its kind in Poland, is a good example of how a fire protection system can be tailored to meet the specific needs of a given application. The main building, the Granaries on Olowianka Island, was built in the late Middle Ages and now hosts extensive exhibitions of original historical objects, stored on both a permanent and temporary basis with thousands of visitors each year. Linear smoke detectors were installed in the two-level exhibition halls and the atria, along with loop-powered sounder beacons to ensure fast and safe evacuation. To avoid interruptions of normal museum operations, the work had to be completed in a very short period of time.

For more information, go to www.siemens.com/firesafety

The art of applied fireproofing

Electrical power is important part of our day-to-day life that's sometime taken for granted. Almost everything needs power; we sometimes forget how it is quietly transmitted across thousands of kilometers from generating stations to homes, schools, hospitals, refineries, through essential infrastructure: the conductors. To enable efficient transmission over long distances, the power is sent at high voltage and the conductors must be covered with quality insulation material to become a capable cable.



Mark Lund



Wei-Kiang Ng

Mark Lund is a licensed Profession Engineer and he serves in industry as the Secretary of ASTM E06.21 – Building Performance, Serviceability and as Task Group Chairman for ASTM E05.11.14 Perimeter Fire Barrier Systems.

Wei-Kiang is currently the Subject Matter Expert (SME) in 3M Singapore specializing in Fire Protection Solutions. He has undertaken numerous projects, providing consultation, best practices and turnkey solutions for Construction and Oil & Gas industries.

Cable has come a long way since the first insulation material used was vulcanized rubber in the New York City power distribution system established 1882. Ever since, power insulation material has evolved into more advanced materials like Water-TreeRetardant Cross-linked Polyethylene (TR-XLPE) protecting cables carrying several hundred kilovolts. Cables are also used in fire alarm systems to trigger warning or alert system. The proper insulation materials are necessary to deploy power and signal through cables effectively.

When a fire breaks out, especially at refineries where temperatures can go up to 1100C within five minutes, the electrical insulation cable jacketing materials are vulnerable to burning away, leading to the cable losing its ability to transmit power and signal. Within minutes, the electrical circuit critical to life safety and process controls will fail, potentially endangering lives and leading to property loss and impacting business continuity.

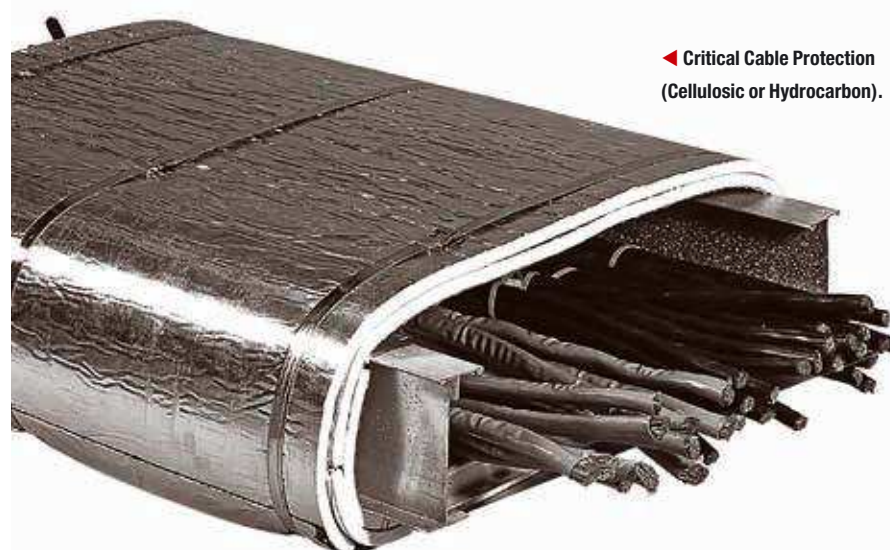
Case Study: Mid West Refinery Fire

In the late 1990's, at an oil refinery in the Midwest, a pipe containing combustible material burst, resulting in a fire plume 15 feet above ground. The fire's intense heat threatened to breach a nearby tank within the refinery that contained hundreds of gallons of hydrofluoric acid.

Immediately recognizing the seriousness of the situation, plant employees sought to move the acid to another tank away from the fire. A cable tray containing critical control circuitry required to send diverting signals to valves had been exposed to the fire. This circuitry needed to stay operational to drain out the tank and 3M Interam Endothermic Mat (commonly known as 3M E-mat) had been installed.

In such critical scenario that required lightning speed actions, it still took 30 minutes to drain out the tank.

How did E-mat help the cables to survive such severe conditions for 30 minutes, which was expected to fail within minutes as the insulation materials burns away?



◀ Critical Cable Protection (Cellulosic or Hydrocarbon).



Images courtesy of 3M Singapore

Endothermic Technology

3M™ Interam™ E-5A-4 Endothermic Mat "E-mat" is a flexible material that uses endothermic technology to release chemically bound water to cool the protected element and retard heat transmission in the event of fire. The product has been tested in schemes that protect power cables against 1100C degree hydrocarbon for 60+ minutes. Many oil and gas corporate fireproofing specifications call for 15-30 minutes of protection. It is often by risk assessment that the user determines the balance of business continuity, cost and life safety. The 3M system can be tuned to address these requirement by lessening the layers of material that are applied.

What is the art behind this hour of circuit protection where many expect to fail within minutes?

The Power Cable

Wires in the power cables can work at very high temperatures and sometimes at intermittent temperatures of up to 250C until oxidation would occur. But in the industry, rarely one would rate their cables at 250C but rather at a maximum of 90C normal operating temperature and up to 40 years of longevity at this normal operating temperature. This is driven by the insulation material's characteristics that actually age

over time with temperature. Overtime 40 years the cables jacket can become brittle and more prone to breakage.

As always, there is bound to be a time, where power cables may have to be overloaded and this emergency overload temperature is generally recognized by industry as 130C. But what happens to the cable insulation lifespan?

As a rule of thumb, for every 10C rise in temperature, the cable lifespan drop by a factor of 2. This mathematical model between cable lifespan and temperature is called Arrhenius relationship.

At 130C, the cable lifespan is shortened considerably to just 1000hrs (42 days). This is why 130C is known as the 'emergency operating temperature'.

Applied Fireproofing of Cables

To ensure cables are to function in the event of cellulosic or hydrocarbon fire, the user shall determine its own cable emergency operating temperature and the required time to control the fire. In the mentioned case study, the cutoff temperature was as a maximum rise of 140C.

The threshold average temperature rise of 140C comes from the ASTM E 1725 test standard which bears the title "Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components".

▲ Minimal Preparation, Easy and Fast Installation.

In the standard, the cable functionality is dependent on the insulation material and its ability to retain its function upon fire exposure. There are various fire test studies on electrical functionality pointing out for the same composition and classification of insulation materials, the failure temperature ranged from 149C to 427C. Independent oven testing of the cables also pointed out varying temperature functionality. This discovery led to the use of temperature as an end point criteria rather than electrical functionality.

E-mat offers great flexibility and thickness consistency that can be easily applied in either 1, 2, 3 or even 10 layers depending on the requirement, and can be installed in a very quick manner. This gives tunable fire barrier protection levels. The layers can be removed easily and re-deployed to other critical protection services when needed.

E-mat offers low ampacity derating of power cable because it allows heat to be dissipated away from power cables during normal operation, unlike other insulation materials that trap heat and could lead to overheating situations.



Images courtesy of 3M Singapore

of fire, structural steel must be protected. Older conventional methods of protection are applying cementitious or intumescent coatings. These traditional methods using cementitious and intumescent coating are sometimes called 'wet methods' of fire protection. Their installation can be labor-intensive and may include the need for a water supply, careful surface preparation, sophisticated pump systems, and have limited installation environments (humidity and temperature). There are also concerns on whether environmental exposure and live loading of a structural beam could possibly affect the adhesion or cracking of these coatings. In addition, coating is permanent and short of doing destructive testing, corrosion under insulation is very difficult to detect.

E-mat as a dry method for fire protection can be applied easily over beams and columns giving flexibility of removal and inspection for corrosion. E-mat is also tested to environmental conditions and its properties are relatively unaffected and it is mechanically attached to beams/columns. Any detachment can be easily detected and easily tightened back. Further merits would be service cables that can be installed and protected along an I-beam wrapped with E-mat, whereas using wet methods this may not be possible.

Conclusion

In any fire protection design, it is important to understand the type of elements to be protected. Be it power cables, structural steel or pipes, a user has to understand the material characteristics. E-mat provides true flexibility in protecting any of these elements as a single go-to fire protection material. The art of fireproofing can be simple when the science of endothermic technology is applied.

3M E-Mat has been used in various applications ranging from power cables, structural steel and pipes. It is the same product used for over 30 years and provides versatile and effective fire barrier protection in building and construction, oil and gas and nuclear industries.

 For more information, go to www.3m.com/emat

References

ASTM E1725, Fire Tests of Fire-resistive Barrier Systems for Electrical System Components, Clause X.2.1.

▲ Dry method fireproofing and hassle-free corrosion inspection.

▼ Up to 4 hours T-rating protection.



For telecommunication industry, fiber optics cables are often re-routed. If wrapped in E-mat access ports can be incorporated into the cable trays envelope and allow for easy service and addition of cables; the cables are still identifiable. If the cables were covered in a coating the ability to identify the cables is lost.

Does the application stop here?

Structural Steel

Structural steel supports are now more commonly found in buildings and refineries. They are typically lighter than concrete and help to speed up construction of a building or storage vessels in a refinery and also taking less space. Though these are the merits of using steel, there are also areas of concerns: fire protection and corrosion.

Concrete and structural steel can both be designed to fulfill load bearing requirements at ambient conditions, but when exposed to fire steel is more vulnerable and will yield at approximately 538C. To prevent such yield and collapse scenarios from happening in an event

3M Science.
Applied to Life.™

Chemically bound water. Applied to maximizing your fire protection.



When exposed to high temperatures or flame, 3M's endothermic technology releases chemically bound water to cool the surface of the wrap, slow heat transfer, and reduce the rate of temperature rise.

While fire isn't inevitable, the risk is real. Protect your people, your property and your bottom line with the 3M™ Interam™ Endothermic Mat. Its endothermic technology provides maximum fire protection for structural components and critical electrical systems required for safe shutdown and evacuation. Plus, you'll appreciate the many advantages this flexible fire protection wrap offers when it comes to installation or inspection.

Plan for the worst by protecting with the best ... 3M E-mat.

www.3M.com/Emat

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Learn more by visiting us at
NFPA Conference & Expo—Booth #701.

Code development 101: Using ICC's cdpACCESS

You've got the one idea that will make the building code easier to understand, the fire code simpler to interpret, and the project owner's bottom line to stay in the black. How do you get it into the code? With cdpACCESS, the International Code Council's® online tool for code development, submitting code change proposals is only a few computer clicks away. Anyone with an interest in improving the model codes is welcome to send their suggestions to this robust cloud-based tracking, collaboration and voting system found at www.cdpACCESS.com.



Rob Neale

Rob Neale is Vice President, National Fire Service Activities International Code Council.

Save time and money while providing a single portal for code officials and other interested persons to stay on top of proposed code changes, offer their commentary and – for code officials – determine the outcome by their votes. The concept of online participation in ICC's Code Development Process dates back to 2001 when off-site voting on code changes was used by the three model code organizations that later consolidated to become ICC.

The development of codes and standards in the United States affects all Americans, as they live, work and go to school in buildings designed to comply with building codes, and use thousands of products, from Apple I-phones to ZipLock bags that meet consensus standards, and in most cases meet many different standards, largely developed by a few hundred private sector, non-profit organizations. Americans sometimes focus on government requirements, but are not often aware of the many private sector standards that are either voluntarily adopted by architects, designers and manufacturers, or adopted as regulations by Federal, state and local governments.

The codes

Most of the jurisdictions in the United States that adopt and enforce building codes and standards use one or more of the International Codes. Other jurisdictions include Guam, Northern Marianas Islands, the U.S. Virgin Islands and Puerto Rico. The ICC is a U.S.-based, not for profit, 58,000-member association of professionals and volunteers who

are responsible for the development, publication and enforcement of model consensus codes for building and fire safety, including the International Building Code® (IBC) and International Fire Code® (IFC). The IBC is in use or adopted in all 50 states, the IFC is in use or adopted in 42 states, while the International Residential Code (IRC) is in use or adopted in 49 states, the District of Columbia, Guam, Puerto Rico and the U.S. Virgin Islands. ICC offers free, read-only access to all its current codes at <http://codes.iccsafe.org/I-Codes.html>.

In addition to publishing these codes, ICC offers its members a variety of important services: code training and education, plan review and code interpretations, technical opinions, inspector certification and agency accreditation, product evaluation, and a range of other products. As code enforcement professionals, ICC Members are encouraged to suggest code changes and vote on them for adoption as model legislation. (See sidebar "Step-by-Step for cdpACCESS" for instructions.)

ICC Members and others with an interest in public safety in the built environment have begun to use the first version of cdpACCESS—the new, cloud-based tool built exclusively for ICC's code development process (cdp). Once referred to as remote voting, cdpACCESS is much more than that. With cdpACCESS, you can create code change proposals and submit them online. According to professional engineer and certified plumbing designer Julius Ballanco, a regular columnist in

PME Engineer magazine, "cdpACCESS maintains the high level of integrity ICC's code development process is known for and is expected to increase participation."

"The ultimate goal is to provide a superior way to develop codes and increase participation in code development," said ICC CEO Dominic Sims, CBO. "We are confident that code development participants and public safety will benefit from cdpACCESS."

Robust and modern features

cdpACCESS is intended to make the entire code development process open and transparent to all participants as well as any person or entity that may be affected by the codes. The portal includes features that allow users to share information and opinions, as well as watch videos of comments made at the various the code development hearings. cdpACCESS allows anyone to participate in code development from a computer or tablet, when you cannot attend in person. This capability alone will save thousands of dollars in travel and lodging expense for those who want to be active in the code hearings. Most important, it makes the entire code process more democratic.

Among the features offered on the cdpACCESS portal are:

- The ability for online collaboration with one or many colleagues;
- The capacity to view, download and print the Code Change Agenda;
- The opportunity for online users to submit floor modifications at the Committee Action Hearings;
- The capability to vote online for assembly floor motions following the Committee Action Hearing. All ICC Members are eligible to vote online on assembly floor motions;
- The capacity to view, download and print the Report of the Committee Action Hearing;
- The ability to create and submit online public comments to the Committee Action Hearing results;
- The capability to view, download and print the Public Comment Agenda; and
- The ability for ICC Governmental Member Voting Representatives and Honorary Members to vote online on proposed code changes/ public comments following the Public Comment Hearing.

Step-by-step to cdpACCESS

Using cdpACCESS is easy, even for the first timer. Here are the steps to get you started in writing code change proposals:

1 In your web browser, select www.iccsafe.org. Once the ICC home page loads, click on "cdpACCESS" in the black banner at the upper right hand side of the screen.

2 You will be directed to the "Welcome to cdpACCESS" portal where – if you are not already registered – you will need to register a username and password at the hyperlink at the bottom of the page. It's free.

3 Once you are registered, select the green Log In button on the "Welcome to cdpACCESS" portal. That's all there is to it... you're now in and able to participate in the ICC code development process. Welcome.



Prepping and testing cdpACCESS

Since not everyone is an expert in a digital world, cdpACCESS developers have made the tool "user-friendly." With a few simple steps, anyone with access to the World Wide Web can submit code development proposals for consideration. ICC has tested cdpACCESS extensively on a wide variety of Windows and Apple computers and the iPad. cdpACCESS is designed for use on Internet Explorer, Firefox, Safari and Chrome. Internet Explorer version 7 and earlier versions are not supported. Analysis of ICC website traffic has shown this will affect a very small percentage of users.

Support for cdpACCESS includes help by phone and email to answer questions, receive comments and suggestions, and report any system errors. The toll-free cdpACCESS hotline is 855-ICC-CDP-1 (422-2371); email can be sent to cdpACCESS@iccsafe.org. Detailed cdpACCESS instructions and a schedule of upcoming webinars can be viewed at www.iccsafe.org/cdpaccess/.

Summary

The International Code Council (ICC) has long been a leader in developing its codes and standards in a transparent and open process, exceeding even the strict "openness" criteria required by the American National Standards Institute. Going beyond the requirement to not impose "undue financial barriers" to participation, ICC has long allowed any individual with an interest to participate in public hearings on code change proposals, and even to vote on issues submitted to the assembly, without payment of any registration fee or participation charge. Providing this access, which is subsidized by the membership and the product sales of the Code Council, has long been a hallmark of the ICC process, and has been a factor in the wide acceptance and adoption of its codes and standards by government entities at every level, and around the world.

For more information, go to www.cdpACCESS.com

NITTAN



Don't Gamble With Fire Safety.

The Nittan Group, with its premium Japanese designed products has been at the forefront of the international fire protection industry since 1954.

We manufacture over four million detectors, each one manufactured to the highest quality adhering to an ISO9001:2008 Quality Management, so you never take a risk with safety.

Our engineering expertise has resulted in exceptional reliability and quality; even allowing us to cater to some of the most demanding markets, including Marine, Off Shore and Industrial customers.

A three year warranty and approvals to global standards make Nittan products the safest bet.



NITTAN email: sales@nittan.co.uk | tel: +44 (0) 1483 769555 | www.nittan.co.uk

FIREX International

Driving global expertise in life safety

FIREX International is the only event that connects the global fire and security markets, and gives fire and security professionals access to the very latest technology from suppliers across the world, plus the cutting-edge solutions and essential knowledge you need to ensure life safety. So whether you work solely in the fire industry or across both fire and security, a visit to FIREX International is a must.

Why you should attend FIREX International:

Whether you are a decision maker or an installer, you need to be at FIREX International:

- See the newest products to reach the market, from both global and local manufacturers, and ensure you're up to speed with all the latest technological innovations.
- Meet the distributors and integrators who can ensure your fire safety offering is streamlined for maximum cost savings while still specifically matching your requirements
- Network with your peers and share ideas
- Learn how you can influence and implement the most appropriate solutions
- Free education programmes offer invaluable insights into key development areas in the fire safety industry, equipping you for business growth in local and export markets
- Get an overview of the latest trends in fire safety, to maintain and hone your competitive edge

FIREX International, organised by UBM EMEA, have secured an enviable speaker line-up for the Protection and Management Series 2016, Europe's leading events for security, fire, safety, facilities and service management, taking place at London's ExCel from 21-23 June 2016.

Headlining a programme of more than 300 speakers will be keynote addresses from Colonel Tim Collins OBE, Kate Adie OBE and James Cracknell OBE, truly inspirational speakers who have shown



grit and determination in the face of adversity. Further speakers will cover sector specific case studies, best practice, training and legislative updates.

Commenting on the line up, Charlotte Wright, Senior Content Manager for Protection & Management

"A wealth of 18 month research with the security, fire, safety, facilities and service management communities has resulted in the most focused programme that the Protection & Management Series has ever seen. Stages this year will welcome a mix of inspirational stories from our headline speakers with practical and insightful sessions from top speakers and trainers. We can't wait until June!"

Colonel Tim Collins OBE will speak on Tuesday 21st June from 11.30 – 12.30, Kate Adie OBE will speak on Wednesday



22nd June from 11.30 – 12.30 and James Cracknell OBE will speak on Thursday 23rd June at 11.30 – 12.30.

The Inspirational Speaker Series will be hosted in the Keynote Theatre at ExCel London.

 For more information, go to www.firex.co.uk

Advanced

Stand D140

Advanced is a world leader in intelligent fire systems. Its focus on performance, quality and ease of use, sees its systems installed in all manner of locations worldwide, from the simple to the most prestigious and challenging.

Advanced systems offer serious advantages for specifiers, installers and end users, whatever the scale of the project. Its panels are universally renowned for their ease of installation and configuration, saving time and money and making maintenance

simple. The device, peripherals, interface and control options available mean Advanced systems can go further and do more. Panels are available from single-loop to eight-loop versions and networks can support up to 200 panels.

Advanced's networking is one of the most efficient and robust on the market, and allows the system to scale easily whilst retaining performance advantages such as speed and robustness.

Leading features and innovations available include

synchronized audio, fan and damper control, false alarm management, touchscreen graphical control, Active Maps, integrated fault finding, CO detection, internet access, BMS integration and dual redundancy.

Advanced's systems are approved to EN54, UL864 and

a host of regional standards. Its core fire systems are augmented by specialist extinguishant release and suppression control systems, radio paging panels, emergency lighting test systems and conventional fire panels.

www.advancedco.com



Baldwin Boxall

Stand E140

With Firex fast approaching our preparations are well in hand for our new look stand. This is always a very busy show for us and we do hope that we will see you there. We will be there on stand E140 so it would be great to see you. Please drop by our stand as we

will be demonstrating the following new products at the show:

- Eclipse4 stand alone Voice Alarm system, and much more
- VIGIL3 transformerless Voice Alarm amplifiers

- Touchscreen microphone – for VIGIL2
- Four way Disabled Toilet Alarm control unit
- and much more...

We are also proud to announce LPCB approval for our VIGIL2 Voice Alarm equipment which will also be on display.

To learn more about the new equipment to be shown at Firex please take a look at a recent news article on our website: Firex news.

www.baldwinboxall.co.uk



BRE

Stand B160

BRE Global Ltd, based in the UK near London, is an independent third party organisation offering certification of fire, security and sustainability products and services to an international market. LPCB is the certification brand used for fire and security products and services. The LPCB mark is accepted worldwide by Authorities Having Jurisdiction. We have representative offices in China, India and Malaysia (serving the ASEAN region).
LPCB listed products can

be accessed, free of charge, at www.redbooklive.com or via apps from Apple, Google and Windows.

LPCB certification covers the following areas:

- Fire detection and alarm products and systems
- Manual fire extinguishing equipment
- Automatic sprinkler, water spray and deluge products and systems
- Fixed fire fighting products and systems (gaseous and water mist)

- Passive fire protection products
- Cables
- Fire doors and shutters
- Smoke and fire ventilation systems
- Cladding systems
- Electronic and physical security products
- Related installers
- Management systems

We have been working with industry, specifiers and government since 1868 to set the standards needed to ensure that fire and security products

and services perform effectively. We offer approvals to European, International, British and our own Loss Prevention Standards (LPS). The LPSs are free to download from our website.

If you would like to call by our stand for further information, details are as below.

www.bre.co.uk



Coopers Fire

Stand D190

Coopers Fire Limited will be showcasing its range of fire and smoke curtain barrier systems within the ASFP Passive Fire Protection Zone at Firex International.

Coopers Fire experts will be on hand to answer all your questions about



how such systems can be used in place of traditional compartmentation to protect atria, stairwells, lift lobbies and means of escape. Displays will demonstrate how such systems operate and explain their construction. Coopers will even be burning a sample of its fire-resistant fabric to highlight its capability for holding back flames.

Coopers will also be launching a new addition to its Concertina range. Available in a variety of widths and shapes, the Concertina

requires no side guides, removing the need for visible columns or corner posts. It is typically used to protect atria, escalators, and stairs.

Coopers Fire has a long history of producing fire and smoke curtain barrier systems and invented and patented the Gravity Fail Safe (GFS) Smoke and Fire Curtain, which has become the benchmark for most systems today. As a result, Coopers Fire products have been specified and installed in many of the world's landmark buildings

including the Shard and Sydney Opera House.

Every Coopers' fire curtain is third party accredited to BS, EN and UL standards, and the business is certified to ISO 9001 Quality Management and ISO 14001 Environment Management. Coopers Fire is the only fire and smoke curtain manufacturer with independent third party accreditation for the installation, commissioning and servicing of fire and smoke curtains.

www.coopersfire.com

C-TEC

Stand G140

Leading life-safety systems manufacturer, C-TEC, is set to unveil a host of new CAST-protocol powered innovations on Stand G140

at Firex International. Star of the show will undoubtedly be C-TEC's new CAST XFP 1-2 loop addressable fire panel. Designed to integrate

seamlessly with an extensive range of C-TEC manufactured CAST devices to create powerful yet cost-effective addressable fire systems, XFP CAST represents an exciting step forward in fire systems technology.

Andy Green, C-TEC's Marketing Manager, said "The availability of our new CAST protocol takes the performance of our popular XFP panels to new heights. With all of the qualities of our existing XFPs but with the added advantage of CAST's

255 devices per loop and 40V 500mA loop drivers, the installation of a high-quality and cost-effective addressable fire alarm system has never been easier."

Also on display will be C-TEC's revolutionary range of 1-8 loop ZFP touchscreen-controlled addressable fire panels, EN54-certified Sounder VADs, ActiV fire detectors, call systems, hearing loops and conventional fire alarm systems.

www.c-tec.co.uk



FFE

Stand E180

A full-sized replicas of the supersonic Bloodhound car is appearing on the FFE stand at FIREX. Why? Because Bloodhound uses FFE's Talentum UV/Dual IR flame detectors.

By utilising infra-red (IR) sensing, Talentum UV/Dual detectors can detect visible and invisible flames from virtually any source, irrespective of any dust, steam or smoke present, and are immune to the effects of wind or draughts. They also give the highest immunity to false flame sources.

Also on display will be FFE's Fireray 5000 motorised, auto-aligning optical beam smoke detector, which is ideally suited to large interiors with high ceilings, enabling coverage of a large area at minimal cost. The Fireray 5000 combines an infrared transmitter and receiver in the same unit and operates by projecting a well-defined beam to a reflective prism, which returns the beam to the receiver for analysis.

Last but not least, the company will also be showing its soon-to-be-launched

explosion-proof Fireray 3000 Exd optical beam smoke detector. Designed for use in potentially explosive atmospheres, such as large enclosures in oil rigs, refineries

and ordnance stores, it provides an early warning of smouldering or strongly smoke-generating fires in hazardous areas.

www.ffeuk.com



Fireco

Stand F190

At Firex International Fireco, provider of simple and trusted solutions for difficult fire safety problems, will be providing information about the workshops they are offering, focused on supporting installers. Visitors to stand F190 will learn how the free workshops help installers increase their profits by finding extra opportunities from their existing jobs. They get hands on training with everything they need to know to install and commission the products in one morning.

The products Fireco will

be showcasing include Freedor, a wireless free-swing door closer. Freedor makes heavy fire doors effortless to open. It allows users to place fire doors open at any angle and automatically closes them on the sound of the alarm.

As Freedor is wireless, it is quick and easy to install, leaving time to carry out more jobs. The team will be on the stand to show how their solutions get jobs carried out quickly and bring in business with their continuous support.

Installers see the benefits

from working with Fireco. Alister Rooney at Arma Fire comments, "The demand for Freedor is increasing, it's a good income source for us. Fireco are a great company to deal with. I cannot

fault the support, guarantees or delivery and they have always given us technical back up when we need it."

www.fireco.uk



Kentec Electronics

Stand E120

Kentec Electronics, one of the world's leading independent fire control panel designers and manufacturers, is set to 'dazzle' visitors to this year's Firex International with their extensive EN, UL & FM, Marine, Analogue, Conventional & Extinguishant ranges of Fire Control Panel Solutions.

Life Safety System Specialists Kentec will be featuring their market-leading Syncro and Sigma ranges – designed for the widest, most demanding range of applications; Sigma XT range

including status indicators plus other ancillaries including programmable warning signs, Sigma XT+ and Sigma Si; the Syncro range including Syncro AS, Syncro View and Syncro Focus, plus a range of site-specific special application fire control panels custom engineered by Kentec to deliver turnkey fire system solutions.

Kentec will also be showing their world-leading UL-listed, FM approved, Elite Analogue Addressable Fire Control Panels, Sigma A-XT releasing panel that offers outstanding value

and performance for all small to medium fixed fire-fighting installations, plus the UL-listed Sigma A-CP conventional panel.

Plus there will be live product demonstrations of the all-new Taktis product range of fire alarm control equipment and the new Syncro XT+ addressable extinguishing panel.

All-new Taktis combines the very latest hardware and software to produce a control and indication system that is powerful and sophisticated, yet simple to use and understand. The flexibility of the Taktis

platform means that it can be re-configured to realize many other control and indication applications, with direct integration into intelligent buildings.

www.kentec.co.uk



Nittan

Stand G90

Nittan will be exhibiting its foremost products from the class leading Evolution range, along with showcasing its new evo+ and evolution 1 fire alarm control panels.



Nittan's range of fire alarm control panels are fully compliant with BS EN54 part 2 and 4, and have been designed to be flexible and powerful by incorporating the latest dual flash-based microprocessor technology. With a host of features for maximum flexibility and ease of installation and system set up, both the evolution 1 and evo+ ranges are compatible with the full range of Nittan Evolution analogue addressable fire detection devices and have been designed with the needs of both

installer and end users in mind.

Other key products displayed in Nittan's ranges will include Evolution detectors featuring patented, award winning Dual Optical technology plus Audio Visual Devices, Bases, Manual Call Points, Isolators and Modules for connection to third party equipment.

As Nittan's premium fire system, the Evolution range will take pride of place on Nittan's stand. The Evolution range combines truly exceptional and reliable fire detection with a

very high degree of protection against unwanted false alarms. Its highly flexible protocol is resistant to interference and allows for substantial amounts of information to be transmitted at high speed. It features Analogue Addressable detectors, with up to 254 addresses per loop as well as a full range of accessories and Conventional devices.

Established for over 30 years, Nittan's Sensortec brand will also be on display.

www.nittan.co.uk

Patol

Stand C125

Patol will be exhibiting on Stand C125 at Firex International to introduce the latest developments in the Securiton SecurIRAS range of aspirating smoke detection (ASD) systems. Patol will be returning to the global fire safety exhibition, having announced at the 2015 show that the company had been appointed as the official UK distributor for Securiton's ASD.

Precision and reliability are key focuses in the SecurIRAS technology, with new additions to the range bringing even

greater flexibility in providing early warning against fire. Two new detectors will be introduced on the Patol stand at this year's show. The ASD 531 is a one-channel detector for monitoring smaller premises, offering quick commissioning through configuration directly from the device rather than requiring a PC. The ASD 532 is also a one-channel detector featuring a smoke-level indicator which offers a compact solution for small to medium-sized applications. It can accommodate a sampling

tube length of up to 120 metres and works reliably at temperatures from -20°C to 60°C. The compact design of the ASD 532 makes it an ideal solution for applications where space is at a premium such as lift shafts, IT racks and prison cells. Both of the new detectors use the same tried and tested HD detector with its large volume smoke chamber providing outstanding sensitivity combined with an impressive long service life.

www.patol.co.uk



STI (Europe) Ltd

Stand F170

STI manufacture an extensive and unique range of fire, safety and security products, many of

which will be on display at Firex. Within the range is an audible polycarbonate protective



Safety Technology International (Europe) Ltd

cover designed to retrofit over manual call points, which is globally recognised by authorities as an essential fire system component on sites where the risk of false alarms is high, for example education, health care and housing.

The polycarbonate range also includes weatherproof enclosures. An ideal solution to extend the life and reliability of call points and switches exposed to harsh conditions such as factory wash down areas.

Also within the Stopper Line are alarm devices for fire extinguishers and fire doors as well as a comprehensive range of protective anti-vandal cages, resettable call points, push buttons and key switches.

In addition, STI's Wireless Alert Series has been combined with the unique features of the Exit and Extinguisher Stopper®, monitoring fire doors and extinguishers 24/7, improving the fire safety of buildings and their occupants.

www.sti-europe.com

ZAPP-ZIMMERMANN

Stand D175

ZAPP-ZIMMERMANN has been offering innovative fire safety systems for more than 25 years, specialising in the areas of cable, pipe and combination penetration seals, as well as fire safety joint seals.

In addition to our proven product line of intumescent moulded parts made of PU penetration seal foam, we also offer other construction materials, such as silicone and acrylic for civil engineering, tunnel construction, shipbuilding, and rail vehicles.

In the course of harmonising fire safety in Europe, ZAPP-ZIMMERMANN GmbH tests its fire safety systems in accordance with the European test conditions to obtain a European Technical Approval.

5 years ago ZAPP-ZIMMERMANN started to test the successful firestop products according to the American standards ASTM E814 (UL 1479) to obtain UL classified firestop systems.

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INNOVATIVE FIRE-PROTECTION SYSTEMS

Inspection, testing and maintenance of active fire protection systems

Installing an active fire protection system is no mean investment yet all too often companies are reluctant to invest the time and money in servicing and testing to ensure that their systems can continue to protect people and property effectively.



Richard Allen

Richard Allen is an Executive Board Director at Argus Fire. He has more than 25 years of experience in the fire protection industry at director level and holds a degree in business from the University of Wolverhampton.

Sprinkler systems are the most common form of active fire protection in offices, shops and schools. But they need regular servicing to keep them in full working order.

Whether they consider it a low priority or are unaware of their responsibilities, some users are risking lives and property by not inspecting, testing or maintaining their systems regularly.

Given the spend on their sprinkler system and the vital role it plays in the

event of a fire, it is surprising just how many companies wait until they hear the beeping noise from their system alerting them to a problem before they give service and maintenance their full attention.

The British Standard BS EN 12845, as incorporated within Part 1 of the Loss Prevention Council Rules for Automatic Sprinkler Installations, makes clear the responsibilities of the user to carry out certain inspections and checks.

Avoiding them could invalidate any certificate of conformity for the installation of their sprinkler or make any insurance warranty void.

There may also be statutory requirements to keep the system

▼ Checking and recording the readings on the pressure gauges for the valvesets controlling the water to sprinklers for a distribution centre.



Image courtesy of Argus Fire



Image courtesy of Argus Fire

serviced such as under the Regulatory Reform (Fire Safety) Order to satisfy a risk assessment for premises, in which case the owner or occupier has a building control responsibility to ensure the system is maintained to the British standard.

The more specialist service and maintenance routines should be carried out, as the standard strictly specifies, under contract by either the system installer or a similar qualified company, who may also offer to carry out some of or all the user checks as well.

Choosing a Level 4 approved company under the LPC Board's LPS 1048 Scheme provides the user with the reassurance that the specialist provider is qualified to service and maintain their sprinkler installation to the highest quality levels.

Companies should test their sprinkler systems once a week and record the results to ensure that water and air pressures and water levels in the firewater storage tank and the pump priming tank haven't fallen significantly, reducing their effectiveness in the event of a fire.

They should seek the advice of their maintenance provider if any falls are

significant, or if the water motor alarm fails to sound on test.

Whether they have a diesel pump or an electric pump, it is also up to the user to carry out weekly automatic pump starting tests which involve reducing the water pressure on the starting device to simulate automatic starting. They should also check fuel and engine lubricating oil levels and the flow of cooling water through open circuit cooling systems on their diesel pump.

Immediately after their automatic pump starting test, diesel pump users should carry out a diesel engine restarting test by running the engine for 20 minutes, stopping it and then restarting it using the manual start button. Again, checks should be made on water levels, oil pressures, and engine temperature and coolant flow, as well as for any leakages.

To prevent freezing in winter, the user should check that heating systems in the sprinkler system are working properly. If water freezes inside a sprinkler system it can damage the joints between pipes and affect the sprinkler heads too.

BS EN 12845 specifies a monthly routine of checking the level and specific

▲ Checking and recording the water pressures on the fire pumps in the pump house serving the distribution centre.

gravity of the electrolyte in the cells of all lead acid batteries including diesel engine starter batteries and those for control panel supplies. If the specific gravity is low and the user has checked that the battery charger is working normally then the time has come to replace the batteries.

The standard also lists a series of quarterly checks and tests that should be made by a maintenance company including the cleaning of sprinklers, multiple controls and sprayers and the replacement of any with paint deposits or that have become distorted.

The servicing company should check for corrosion and renew any paintwork, repair tape wrapping, and check for any unlawful electrical earthing connections on pipework and pipe supports.

It should also test the water supply and their alarms, check any secondary electrical supplies from diesel generators, operate all the stop valves controlling water



▲ Checking that the main valves on the water storage tanks next to the pump house are operating correctly.

flow, and check the flow switches to ensure everything is in full working order

As well as servicing current parts, BS EN 12845 requires the service company to check the number and condition of replacement parts held as spares.

The quarterly requirements also extend to a review of hazard, which will involve the user's insurance company checking whether there have been any building changes that may require a change in design of the sprinkler installation.

On a half-yearly basis, the servicing company should follow the manufacturer's instructions in exercising the moving parts of any dry alarm valves in dry pipe installations.

Alternate valve systems, which typically comprise a dry and wet control valve, an accelerator, sprinkler heads and a dedicated water supply system, need to be charged up with air in the autumn ready for the cold weather to avoid freezing, and put in wet mode during spring for the warmer months.

Once a year the service company should check that each water supply pump delivers the pressure and flow rate as stated on the nameplates at full-load

condition using the test line connected from the pump delivery pipe.

It should also check that the automatic starting sequence makes six attempts to start the diesel-engine for the fire pumps when the fuel supply is turned off and that it switches over to the other duplicate starting batteries after each attempt, and then resets itself automatically.

Ensuring the float valves on the water storage tanks work properly is also on the yearly inspection list. The pump suction strainers and settling chamber and their respective screens also need to be cleaned where necessary, and the diesel engine serviced in accordance with the manufacturer's instructions.

BS EN 12845 also recommends that certain sprinkler system checks take place although less frequently. As they require protection from the elements, service providers should check the outside of storage and pressure tanks for any signs of corrosion every three years. If there are any such signs, the tank will need to be drained to check for any internal corrosion, with repainting or repair work carried out if necessary.



Images courtesy of Argus Fire

The provider should also check and overhaul, or replace, any water supply stop valves, alarm and non-return valves every three years. While the inside of all storage tanks need to be checked and cleaned or repaired every ten years.

Outside regular inspection visits, it is essential that the end user reviews all their service reports and follows up any faults immediately with the maintenance company. A typical contract with a fully qualified maintenance provider will include 24-hour call outs for 365 days a year.

What is especially important is that any remedial work carried out following a service is undertaken by a fully accredited specialist sprinkler specialist and that users should not attempt to repair systems themselves.

A specialist provider such as Argus Fire with LPS 1014 (fire alarm) and LPS 1048 (sprinkler) accreditation will service and maintain not only sprinkler systems but wet and dry risers, hose reels, fire extinguishers, hydrants and gas suppression systems as part of a maintenance contract and agree a full schedule of inspection, testing and maintenance routines.

▲ Carrying out a weekly run on the diesel set in the pump house.



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Foam firefighting systems in rail tunnels

Since 2007, SP Fire Research has been involved in the development of a foam firefighting system to protect rail tunnels carrying freight trains in Antwerp's harbour district. SP's role in the project, with a total budget of over EUR 870 million, has been to evaluate the performance of the firefighting system, to provide data for determining the necessary system design capacities, and to act as an independent third party for tests of the systems in Antwerp. The tunnel system was opened for traffic in December 2014.



Magnus Bobert

Magnus Bobert gained his Master of Science in Engineering Mechanics at The Royal Institute of Technology (KTH), Stockholm, in 1995. Magnus is working at the Fire Research department at SP Technical Research Institute of Sweden, mainly with testing and research in the area of, fire protection, fire extinguishing systems, extinguishing foam and fire testing for the vehicle industry.

In February 2007, SP was invited by Svenska Skum AB (nowadays part of Tyco Fire Protection Products) to witness a demonstration test of a high expansion foam system in a test tunnel at the If Sikkerhetssenter in Norway. The demonstration was a result of initial discussions between Tyco and TUC RAIL, the Belgian company that had been instructed to specify the requirements for the extensive project for improved rail transport to Antwerp's harbour area.

Almost eight years later, in 2014, the Liefkenshoek Rail Link ("Liefkenshoekspoorverbinding") is ready. 16,2 km long and up to 40 m below ground level, it runs under two canals and the

River Schelde. About 13 km of the link is in tunnel, consisting of a twin-track tunnel, the Beveren Tunnel, and a double tube tunnel, the Boor Tunnel. The foam firefighting system that SP has assisted to develop consists of 5500 foam generators installed in 60 m long sections that are activated three at the time (i.e. 180 m) in the event of a fire (see Figure 1).

▼ Figure 1 – A map of Antwerp's harbour area, showing the new Liefkenshoek Rail Link (green). The black sections show the two tunnels; the twin-track Beveren Tunnel and the double tube Boor Tunnel. The red route is the earlier connection. Map: By the courtesy of the Port of Antwerp.



► Figure 2 – A simulated locomotive and freight wagon in the tunnel section. The 'locomotive' contains a 4,5 m2 pool of heptane and a diesel oil spray.

The owner of the rail link is Infrabel, Belgium's state-owned equivalent of Sweden's National Transport Administration. Infrabel has in turn employed the TUC RAIL consultancy as the requirements specifier and project supervisor.

The project was awarded to Locorail, a consortium consisting of the companies BAM, Vinci and CFE. The physical design and build construction was carried out by Locobouw, in turn a consortium of several companies.

The firefighting system has been designed and built by Locofire, a consortium of BAM Techniek bv and Aquasecurity NV. It is based on a system developed by Svenska Skum AB in the 1980s under the name of HotFoam®. Svenska Skum AB is nowadays part of Tyco Fire Protection Products, which was also involved in the project.

High expansion foam generated by fire gases, known as inside air system

The system that was demonstrated in Norway in 2007 was a HotFoam® system, a high expansion 'inside air' foam system having foam generators that using air from inside the protected space. High expansion foam is a foam extinguishing media consisting of high expansion foam that can fill a protected space. Fixed high expansion foam systems are traditionally used in buildings in which some particular object is to be protected, such as a store or an aircraft hangar. High expansion foam is also used by fire and rescue services as a manual system to fill rooms or buildings with foam. In conventional high expansion foam systems the foam generator is placed such that it draws air from outside the building, i.e. the air and fire gases in the protected room must be ventilated away at the same rate as the foam is applied. If not, a positive pressure will build up, and no foam can be generated. In an 'inside air' system, the foam generators are installed in the building, using the inside air (fire gases) to generate their foam. The generators are of a simpler and more



Image courtesy of Magnus Bobert

robust design, without fans as normally used in conventional high expansion foam systems. In addition, there is no need to ventilate the space while the foam is being delivered. The drawback of such a system is that foam production falls off with higher temperatures of the fire gases, and can also be affected by the composition of the gases. 'Inside air' systems therefore require special foam concentrates that are more resistant to fire gases. The HotFoam® system has specially designed foam generators and a foam concentrate specifically developed for inside air applications.

Initial fire tests in SP's large fire test hall

SP Fire Research was asked by Svenska Skum AB to develop and perform a test programme to represent likely fires in a freight rail tunnel. A simulated locomotive and wagon were built and loaded with various types of fire loads. As the rail tunnel in Antwerp will be used for the transport of various cargoes, including chemicals and a range of fuels, potential fire sources of pool fires, spray fires and pallets were chosen. A series of tests was carried out in December 2007 in a section of tunnel that was built in SP's large fire test hall. The tunnel section was about the same as that of the Antwerp tunnels,

i.e. with a cross-sectional area of about 40 m², see Figure 2.

In addition to deciding suitable fire scenarios, a key part of the work was also to provide basis for determining the necessary design capacity of the HotFoam® system.

For a water-based fire-fighting system, (e.g. sprinklers, foam), the quantity of extinguishing media applied per unit of time and per unit of area is a critical parameter, i.e. application rate. As high expansion foam fills a space, the unit of volume could be used instead of units of area, but in fact the application rate, expressed as l/min m², is also used for high expansion foam. The parameter filling rate, i.e. the rate at which the level of foam rises in the space (m/min), is often also used for traditional high expansion foam systems. This can be relevant if we know by how much the foam expands for a given system, i.e. the expansion ratio. In the case of an inside air system, foam production varies considerably, depending on the temperature and composition of the fire gases. If we are to talk about the filling rate, it is then preferable to use the term 'nominal filling rate', which is calculated from the application rate and the expansion ratio at a particular water pressure. For example, it was found in our fire tests in



▲ Figure 3 – The burning heptane pool when the foam has reached up to the edge of the locomotive's apertures and started to flow in. At lower application rates, the foam did not manage to get into the locomotive, with the filling rate falling to zero when the foam had reached part-way up the locomotive.



► Figure 4 – Simulated locomotive and freight wagon loaded with wooden pallets.



► Figure 5 – The southern end of the If tunnel after conclusion of a test, showing foam pouring out of the tunnel.

the tunnel section that, after foam had been produced for a while at some particular application rate, the filling rate fell to zero. In other words, the application rate was insufficient to extinguish the fire. After a number of tests, we arrived at the minimum necessary application rate. See Figure 3.

Tests in the 100 m long If tunnel in Norway

A series of fire tests was performed in the 100 m long test tunnel at If Sikkerhetssenter in Norway in March 2008. Fire scenarios and fire-fighting system capacities were chosen on the basis of the results of the tests in SP's large fire test hall. A total of 30 foam generators, distributed over three sections, were used in order to achieve the nominal application rate. The fire scenarios were those that had been used previously, although in certain cases a considerably higher fire load was created than could be employed in the test hall. The potential heat release rates from the various tests ranged from 9 MW to 100 MW.

The If tunnel has a cross-sectional area of about 40 m², which corresponds to the cross-sectional area of one of the Antwerp tunnels (the Boor tunnel). However, the If tunnel is considerably shorter, which means that one entire 180 m long section (3×60 m) could not be used. Simulation of the considerably longer Antwerp tunnel was achieved by partly blocking the tunnel's openings. The assumption was that the foam produced in a 180 m section in a longer tunnel would to some extent hold back foam produced by foam generators further in towards the centre of the section. See Figures 4-5.

New tests

The work of the rail link project continued, with one of the elements being evaluation of other suppliers of foam extinguishing systems.

SP was contacted by Locofire at the end of 2011 to discuss additional tests in order to measure the actual filling rate of the foam. It was decided to perform additional foam filling tests in the If tunnel, without a fire, with the HotFoam® system installed, and as far as reasonably possible with the same conditions as during the 2008 fire tests. With the assumptions, and under the test conditions, a filling rate of 1,9 m/min was measured, and this was set as a requirement for the real system in Antwerp. See Figure 6.

Fill tests in Antwerp

On behalf of Locofire, SP attended and witnessed tests performed in the two tunnels in Antwerp. SP's role was to attend and, as an independent third party, to monitor the tests and to prepare a report on the test conditions and results. The system installed in the tunnels was based on the foam generators used in the HotFoam® system, somewhat modified in respect of the way in which the generators were mounted. Tests were performed in December 2012 and January 2013. The test results showed that the filling rate in some of the tests was lower than had been expected, and that foam production varied from one test to another. See Figures 7-8. Facing chemistry changes of such a long development project, a new foam concentrate had to be reformulated that could meet or exceed design criteria's from the beginning of the test in 2007.

New tests, with a new foam concentrate

During 2014, SP performed foam filling tests and fire tests in the If tunnel, using the new generation foam concentrate HotFoam 2%, in the same way as for the 2008 and 2012 tests. The measured filling rate in these tests was 2,1 m/min, which became the criterion for the Antwerp tunnels. The fire tests using the new foam concentrate showed similar performance to that of the 2008 fire tests. The performance requirements were regarded as fulfilled with the use of the new concentrate. Only final tests in one of the Antwerp tunnels now remained.

In addition to the tests for the tunnel application, it was also specified that the foam concentrate should fulfil the requirements for which the system using the old concentrate was already certified, such as for engine rooms in ships in accordance with IMO requirements. These tests were performed by SP in 2013.

Foam filling tests were performed in one of the Antwerp tunnels in April 2014 under SP's supervision. The filling rate was measured as 2,9 m/min, thus clearly exceeding the criterion of 2,1 m/min.

The tunnel was officially opened on 9th December 2014, and the first trains passed through it on 16th December.

► For more information, email magnus.bobert@sp.se



▲ Figure 6 – The If tunnel with the HotFoam® system installed. In the foreground can be seen one of the three depth gauges used to measure the foam depth, monitored by video cameras. Some foam is still left on the walls and floor of the tunnel after a test.



◀ Figure 7 – The foam system installed in the Boor tunnel in Antwerp.



◀ Figure 8 – Testing the foam system in the Beveren tunnel in Antwerp.

Simplest is not always safest

Over the last twelve months there has been increasing discussion in the UK about the different routes to compliance for the façades of buildings containing living or work space 18 metres, or more, above ground level. The complexities of the regulations, combined with a general lack of clarity, have led to some interesting debate. One key question stands out: does the simplest route to compliance lead to the safest solution?



Adrian Pargeter

The reality is that a wide range of factors can influence how fire affects a building, from the specific combinations of materials used in the construction, to the probable contents, and the reaction and behaviour of the occupants. Therefore, whilst acknowledging that compliance with the regulations is important, surely the real consideration should be the overall performance of the building as built and in use.

Fire professionals, together with the construction industry, therefore need to get behind the real issue, which is not whether the individual elements of a building simply comply, but whether the building itself has been designed and built to minimise risk. This is because the risk in question could potentially lead to loss of property, damage to the environment and, more importantly, injury or death through fire.

The regulatory context

In order to understand the issues better, it is useful to look at the current approach to the design and construction of façade systems in tall buildings. In this application, there is often much focus on the performance, in isolation, of the insulation component.

For example, if you follow the linear route to compliance outlined in Approved Document B2 Section B4-12 – Construction of external walls, for England and Wales (ADB2), and Technical Handbook Section 2 for Scotland (THB2), all components are required to be of limited combustibility or non-combustible respectively.

▼ Over the last twelve months there has been increasing discussion in the UK about the different routes to fire safety compliance in rainscreen clad buildings containing living or work space 18 metres or more above ground level.



Head of Technical and Product Development
Kingspan Insulation Limited.

However, the publication of the updated BCA Technical Guidance Note 18: Issue 1 Jun 2015 highlighted the fact that there are three alternative allowable options to compliance: the standard performance based route, which uses large scale testing to demonstrate fire safety; desktop study reports; or a holistic, fire safety engineering approach.

The linear route

A linear approach to compliance relies on the fire ratings of individual elements, quite often based on the material's ability to meet basic performance criteria when subjected to small scale fire tests. In practice it is possible to specify a component that is, to all intents and purposes, compliant with the requirements of ADB2 and THB2, but which, when built into a system, would fail the rigours of the large scale tests, because of the complexity of the interactions between the various components. This can lead to a gap between the design and the actual fire safety performance and, with the popularity of façade systems continuing to increase, it is vital that this gap is closed.

Performance route – large scale testing option

BR 135 'Fire performance of external thermal insulation for walls of multi-storey buildings', is directly referred to in both ADB2 and THB2, and sets out the performance criteria for the allowable large scale tests. The large-scale testing option of the performance based route provides data that is more reliable than that of small scale tests, solving many of the issues of the linear approach.

The relevant testing for external walls cited by BR 135 is BS 8414 – Fire performance of external cladding systems, Part 1: 2002 (Test methods for non-loadbearing external cladding systems applied to the face of a building), or Part 2: 2005 (Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame).

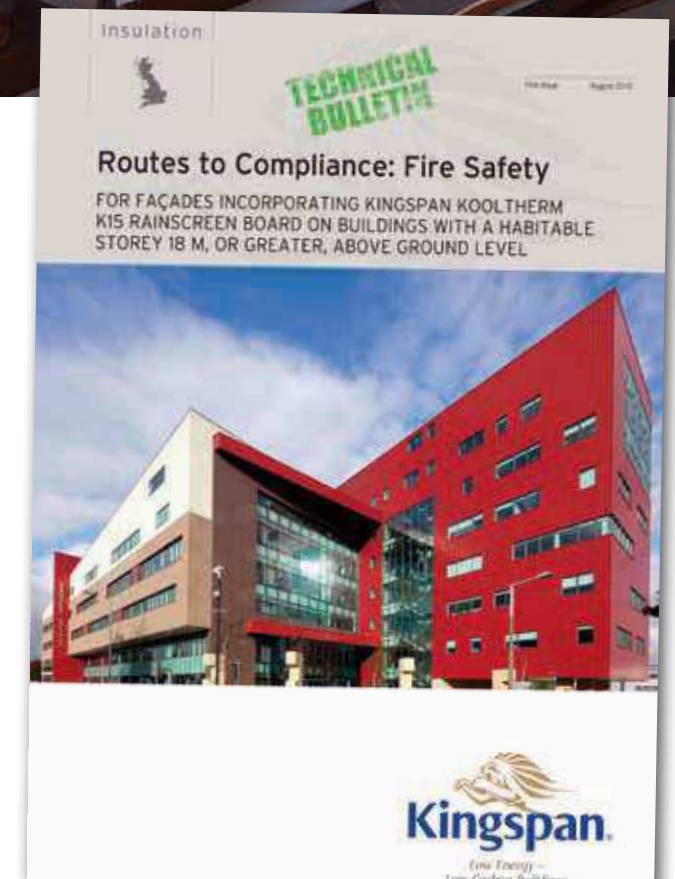
According to the guidance documents, and supported by BCA Technical Guidance Note 18: Issue 1 Jun 2015, products successfully tested to these standards as part of a complete external cladding system can be deemed compliant for the applications they have been tested in. The key here is that the complete façade build-up is tested, rather than relying on the stand-alone performance of individual



Images courtesy of Kingspan Insulation Limited

▲ Kingspan Insulation Kooltherm K15 Rainscreen Board was the first insulation board to achieve certification to BS 8414, having been successfully tested in accordance with the performance criteria set out in BR 135.

► Kingspan Insulation has released a new technical bulletin regarding fire safety in rainscreen application on buildings with a habitable storey 18 metres, or more, above ground level.





◀ Kingspan Kooltherm K15 has LABC System Approval for use in rainscreen cladding applications, and also helped Coleg Cymunedol Y Dderwen Comprehensive School in Bridgend achieve a BREEAM 'Outstanding' rating.

components; an approach which does not account for the design or overall construction of the building.

Clearly, it is impractical for manufacturers to test for every possible scenario. Nevertheless, in what is still an emerging area, expanding testing to cover some of the more common build-ups will help to improve the overall industry knowledge and inform the work of fire safety engineers.

Performance route desktop study options

Since the sheer range of possible build-ups and material combinations makes it unrealistic to expect every permutation to be tested, BCA Technical Guidance Note 18 advises that a desktop study report can be submitted from a "suitably qualified fire specialist" as a practical alternative. Within the report, specialists are asked to use their professional experience and knowledge to determine whether a particular system will meet the acceptance criteria within BR 135.

The report must be backed with the results of testing by a suitable UKAS accredited testing body, and should make specific reference to any actual tests that have been carried out on the product. In addition to fire test data, the specialist will also typically require further information including: plans; elevations; section and fire barrier details etc.

Still based upon empirical test data, the desktop study approach therefore

provides a sensible route to determining compliance without having to test for every possible combination and scenario. It is also supported by Local Authority Building Control and the National House Building Council (NHBC). In terms of straightforward compliance it is always worth checking with the warranty provider for the property in the first instance, as the specified construction may already meet the requirements in many applications, whichever route is being considered.

Fire safety engineering route

A 'whole building' fire safety engineering approach uses the application of scientific and engineering principles to provide a holistic solution within the building design. Not only does it consider the performance of structures, systems, products and materials when exposed to fire, it also looks at fire prevention as well as active and passive fire protection measures. These might include effective means of egress, compartmentalisation with intumescent fire barriers, and adequate measures for alarm, detection, control and extinguishment.

This approach requires every factor of a building to be fully considered, from general aspects such as building type, location and occupancy level; to specific details such as how different cladding or roofing materials combine.

Both ADB2 and THB2 agree that a fire engineering approach is the only

practical route for more complex projects, regardless of height. By making fire engineers a central part of every stage of the construction process, and maintaining full collaboration with all interested parties, it should be possible to achieve effective fire performance; both in the initial design and in the finished building as a whole.

Balanced performance

However important it is, fire safety is just one of a number of considerations when installing and insulating a façade system. With many projects targeting high levels of energy performance, and plots becoming increasingly tight and costly, it is important to select insulation materials that can deliver both excellent fire and thermal performance, with the minimal possible thickness, and that have been proven through relevant testing. This can allow available space within the building footprint to be maximised, potentially leading to significant returns for building owners, without increasing risk.

By using a desktop study or fire safety engineering approach to analyse the fire performance of the product within the context of the final façade system, it should be possible to meet all of these requirements simply and effectively, both on paper and in reality.

Applying the principles

The four different routes to compliance outlined above fulfil the regulatory requirements for rainscreen-clad buildings containing living or work space 18 metres or more above ground level. By thoroughly understanding the various options, and putting them into practice appropriately, it is possible to achieve safer, higher performing buildings that are ready to meet the particular demands of our increasingly energy conscious society.

To help address the complexities of the regulations, and some of the misconceptions surrounding the use of insulation in rainscreen and masonry façades, Kingspan Insulation is running a blog series: blog.kingspaninsulation.co.uk/category/façades-fire-safety/ to accompany its in-depth technical bulletin, which can be downloaded at www.kingspaninsulation.co.uk/routestocompliance.

➔ For more information, go to www.kingspaninsulation.co.uk/routestocompliance

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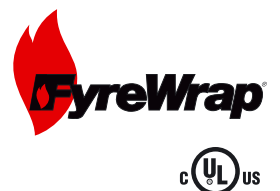
Recent FEMA statistics indicate significant injuries, loss of life and property damage due to clothes dryer fires in residential buildings. At the same time, code requirements for clothes dryer ventilation ducts in multi-family residences have been difficult to achieve in real-world conditions – until now.

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More information on FyreWrap DPS and our complete line of FyreWrap products is available at www.arccat.com and www.unifrax.com or by calling 716-768-6500.

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Fire safety for the Gotthard base tunnel

The Gotthard Base Tunnel (GBT) is the centerpiece of the new transalpine railway link in and through Switzerland. This tunnel of superlatives is not only the world's longest railway tunnel, it is also a prestige project that showcases Swiss engineering at its best. The extraordinary circumstances of this project required ingenious technical modifications and adjustments. It was the right kind of challenge for Marco Pradera, project lead at Siemens. The tunnel expert shares his experiences from working underground at Switzerland's most fascinating construction site.



Marco Pradera

Marco Pradera loves the vast expanses of Finland as much as he does the Swiss Alps. It does not matter to him whether he covers the large distances and the many hundreds of meters in altitude in his marathon-tested running shoes, on cross-country skis or on a mountain bike. That is one side of Pradera. The other side is drawn to the deep: As an electrical engineer for the Siemens Building Technologies Division, Pradera works on fire safety in tunnels. Not

just in any tunnel but the showpiece of state-of-the-art tunnel engineering: the Gotthard Base Tunnel, the longest and deepest railway tunnel in the world. Scheduled to open in 2016, it is at the heart of Switzerland's NRLA (New Railway Link through the Alps) project.

The Gotthard Base Tunnel (GBT) runs for an impressive 57 kilometers from the north portal in Erstfeld, Canton Uri, south to Bodio, Canton Tessin. To create the two single-track main tubes and the safety, ventilation and cross tunnels, 28.2 million tons of rock have been removed since the first blast 17 years ago – a truly remarkable feat of Swiss engineering.

▼ Gotthard Base Tunnel.



Image courtesy of Siemens

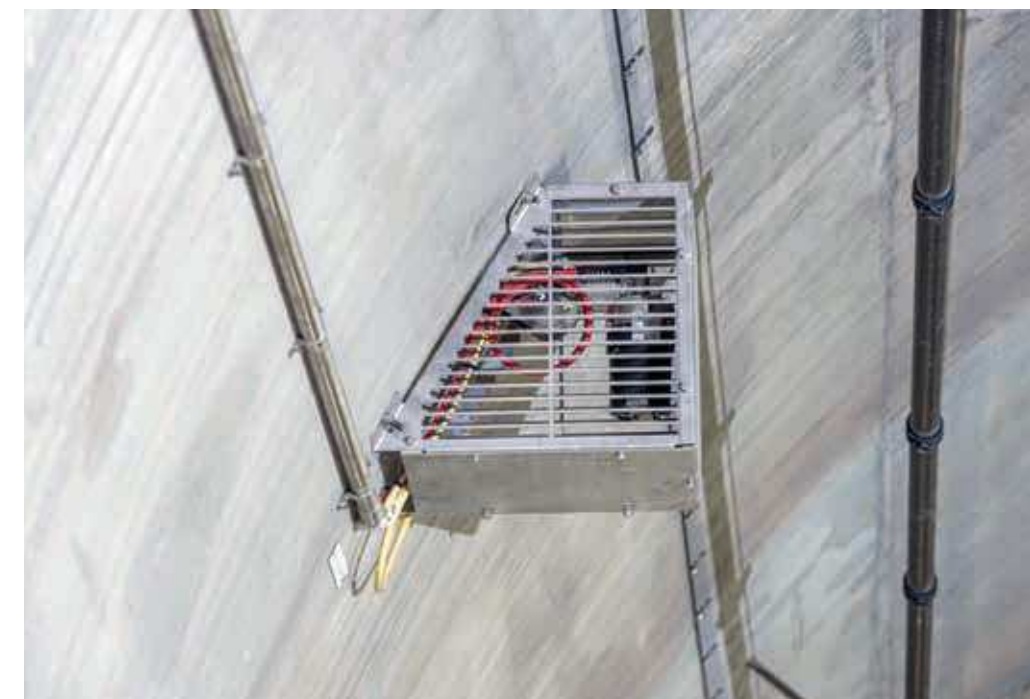
Marco Pradera is Senior Project Manager at Siemens Building Technologies Division.

The coolest construction site in Switzerland

The numbers alone illustrate the huge difference to the existing Gotthard Tunnel. Riding a train today bound for the southern Alps, you notice very clearly how the trains makes a tortuous climb on a winding track and through helical tunnels to cross the Alps at an elevation of 900 meters above sea level. There are "only" 1,100 meters of mountain above you – a relatively modest weight compared to the new GBT. Its maximum elevation is 550 meters above sea level; it makes only minor climbs and it does not have any tight curves. However, it leaves 2,300 meters of rock above your head. This takes some getting used to. But it is worth it because the trip from Zurich to Lugano will take only two hours (45 minutes less than before), and Milan will be just three hours away. These figures have been received with a great deal of enthusiasm – not only by the Swiss public, which loves rail travel, but also by the technicians and engineers who got to work at what Marco Pradera, overall project lead for fire safety solutions in the tunnel, calls "the coolest construction site in Switzerland."

Safely barreling through the tunnel at 250 km/h

Pradera's first contact with the Gotthard Base Tunnel project was via telephone. "At first I thought they were calling me because of the Gotthard Road Tunnel," he remembers. He had been a project lead there as well, in charge of fire monitoring in the tunnel, the ventilation stations, the two road maintenance depots and the buildings for the police and fire department. It was obvious that Pradera had done a great job on that earlier project because he was picked to work on the GBT. This has not been an easy project – not only because of the technical challenges but also because many different companies are working simultaneously on a variety of subprojects. Unexpected surprises popped up as early as during the detailed calculation phase, not to mention the actual implementation on site. Pradera does not seem to be fazed: "I like projects like that. You need to work with the customer to find the best solution. It always works out in the end. Run-of-the-mill projects aren't really my thing."



▲ Smoke detectors are protected by cages.

It goes without saying that safety is paramount in a tunnel where in the near future more than 200 trains a day will barrel through the tubes at speeds up to 250 km/h. The tubes are connected every 300 meters by crosscuts that allow train passengers to escape to the other tube in case of a fire. "The biggest danger isn't fire, it's suffocation," explains Pradera. Each tube has two emergency-stop

stations 600 meters in length which allows the evacuation of up to 1,000 passengers. To prevent disasters from ever happening, the tunnel is equipped with a myriad of sensors, monitoring devices and controllers which are connected to the control centers at the north and south portal via thousands of kilometers of optical fiber cables.

▼ Marco Pradera.



Images courtesy of Siemens



Image courtesy of Siemens

Fire detectors in cages

Fire detection in the four emergency-stop stations is handled by three different detection systems, which control the air dampers directly if an evacuation becomes necessary. The controllers check and record the monitoring data every few milliseconds to ensure the history can be traced and the trigger parameters optimized. The installation of the Fibrolaser fire detection technology from Siemens required special modifications. Typically, Fibrolaser cables are mounted at a distance of 5 cm from the wall because this ensures optimal transmission of temperature readings. For technical reasons, however, they were mounted directly against the concrete wall in the GBT. In addition, Fibrolaser sensors on the floor watch for initial signs of danger. "A stuck wheel on the train, for example, or leaking fluid can catch fire," adds Pradera. For Fibrolaser floor installations, armored cables were used to ensure protection against water spray and mechanical stress. For ceiling installations, cables without metal were used to avoid interferences with the 15 kV overhead lines.

In addition to Fibrolaser, the Gotthard Base Tunnel is equipped with thermal imaging cameras and smoke detectors which continuously measure the temperature and check the air for smoke particles. To protect them against the harsh environmental conditions in the

tunnel, they were enclosed in cages – another custom design for the GBT. Everything is built for trains which can achieve speeds up to 270 km/h, with a little extra room to spare.

No access without a stress EKG

Working in the tunnel is anything but child's play. Each person has to pass a heat test and stress EKG required by the Swiss Accident Insurance Agency (SUVA), followed by safety training: People without training are not permitted access. Only those who pass the test are allowed on site. At all times, they are required to wear reflective safety clothing, a helmet, heavy-duty mountain boots and a heavy backpack that weighs 15 kg. The backpack contains life-saving gear – a face mask, balloon and oxygen cylinder – which ensures 50 minutes of survival in a smoke-filled environment. This kit alone weighs three kilos and costs over 1000 Swiss francs, but nothing is too expensive when it comes to saving lives. Other items in the backpack include a radio, notebook PC, lamp, ear and wind protection, a folder with writing materials – as well as enough food and drink for an entire day at 40°C because the nearest supply station is too far away. In the morning, a train takes the technicians into the mountain; in the evening, they return on another train.

Even though Pradera and his colleagues were well prepared, it doesn't

◀ Fire detection by Siemens: thermal imaging cameras, smoke detectors, and Fibrolaser.

come as a surprise that a few unexpected things happened. "At BT we have a lot of experience with road tunnels, not quite as much with railway tunnels. In a road tunnel, you simply put everything you need in the car, and if you forget something, you jump in the car and get it. In a railway tunnel, you have to carry everything yourself and are dependent on the departure times of the train," explains Pradera. "When working on the cameras, we hit our heads on the overhead lines more than once. But that's what helmets are for."

Finally in the home stretch

The overhead lines have been connected since October 2015. During the day, an elaborate test phase is being carried out in two shifts; it will continue until February 2016. Time slots for service tasks, for example cleaning the cameras or optimizing the parameters, have to be requested 28 days ahead of time, and the actual work has to be performed during the night. "That's why long-term planning is so important. Fortunately, I now have remote access, which allows me to take care of a lot of things. Still, I'll be glad when testing shifts to the nighttime hours beginning in March 2016 and we'll be able to work during the day again," says Pradera.

He is very proud to be a part of this project, he adds, even though he was always happy to "get away from the noise and dust in the evening. Access is difficult and the air is bad. Working below ground is extremely strenuous." Swimming in Lake Urner and having a cold beer from Stjär Biär, the local brewery, helped Pradera cool off in the summer.

When regular rail service begins in December 2016 after thousands of test runs, BT's Gotthard Base Tunnel expert will finally be able to take it a bit easier. Asked whether he plans on ever taking a train through the tunnel, Pradera says: "Never say never. But if I have a choice, I prefer to go over the mountain instead of through it. Not for safety reasons, but simply because you see a lot more."

➔ For more information, go to www.siemens.com/tunnels

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Fire extinguishing and detection systems in general aviation

In the modern and general aviation the fire suppression systems is divided into two subsystems – the Fire Detection System and the Fire Extinguish System.



Adneido Souza

Fire detection system

The aircraft systems that have fire detection are:

- Engines (Turbines)
- APU (Auxiliary Power Unit) – this is a small engine installed generally in the aircraft tail. It is used to start the big engines (Turbines) and provides electrical power and air conditioning mainly on the ground
- Cargo Compartment
- Avionic Compartment
- IFE (In-flight Entertainment)
- Lavatories

The fire detection installed on engines and APU are sensitive loops like protected wirings. This operates when it detects the temperature increasing and suffers variation in its material composition and sends an electrical signal to the smoke detector computer which informs the pilots.

The Cargo compartment has electronic detector boxes installed in the cargo ceiling. When there is signal of smoke, the detector feels the smoke density and then inform to smoke detector computer that transmit this information to the cockpit.

The Avionic and IFE compartments have similar smoke detector, when smoke is detected an electrical signal is also sent to the cockpit.

Fire extinguishing system

Presently the main fire-extinguishing agent used in all aviation systems is Halon (Bromotrifluoromethane).

Halon systems are the best for aviation, but not for the environment or the ozone layer. Because of that, Halon has not been produced since the Montreal Protocol on 'Substances that deplete the Ozone Layer' was signed in September 1987. This is an international agreement banning the production of Halon.

There some alternative agents being studied in world to replace halon totally. At the moment there is only an alternative agent called FE36, but this one is a little heavier than halon gas and has been used in lavatory trash can only.

Generally, depending on the manufacturer, the fire extinguishing bottles installed in engines, APU and cargo compartments must be removed at established intervals for weight and hydrostatic testing. These scheduled maintenance intervals can be controlled in calendar days or in flight hours depending on the aircraft utilization.

▼ Engine fire extinguishing operation – fire extinguisher bottles



Engine fire extinguishing operation

Considering an aircraft dual-turbine, generally there are two fire extinguisher bottles to support both engines. When the pilots are informed by the fire detection system that there is an engine fire, the pilot operates the fire extinguisher handle, which closes all sources such as electrical power, pneumatic and fuel, and further the pilot shoots the first bottle and waits to see if the fire has been extinguished. If the engine fire continues, then the pilot shoots the second bottle. In the meantime, the co-pilot has declared an emergency and prepares to land the aircraft.

APU fire extinguishing operation

The APU is generally used on the ground, but can be used in flight as well. The operation to extinguish a fire in the APU is similar to the engines (Turbines), but generally there is only a small fire extinguishing bottle exclusively for the APU.

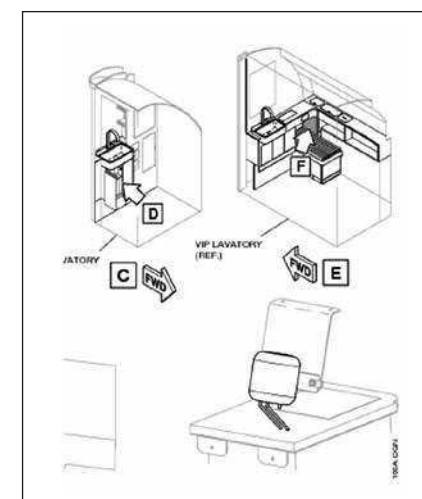
AVIONIC fire extinguishing operation

There is no fire-extinguishing bottle for this. The pilot controls the air ventilation / cooling in the avionics bay in order to suppress the oxygen.

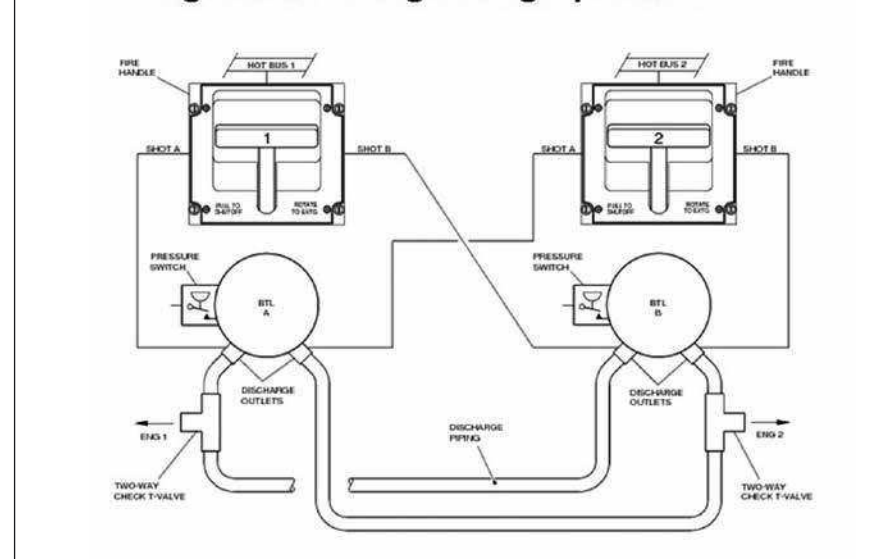
IFE fire extinguishing operation

IFE is located in the passenger cabin to which the flight attendants have access. The fire extinguishing is done by portable fire extinguishers installed in the main points of the aircraft. The amount of portable fire extinguishers is proportional to the amount of passenger seats. This is regulated by the aviation authority.

▼ Lavatories fire extinguishing.



- Engine Fire Extinguishing Operation



Lavatories fire extinguishing operation

Although aviation authorities forbid smoke in the lavatories, the lavatory auto-discharge fire-extinguisher system comprises a fire extinguisher bottle installed in the waste disposal of each lavatory. It is charged with extinguishing agent and it is mounted with the discharge pipings extended into the lavatory waste compartment, above the waste container with the pressure gauge visible when the waste disposal door is open. When the temperature inside the waste compartment reaches predetermined temperature (about 77 degrees Celsius), the extinguishing agent is discharged to put out the fire. The discharge piping controls the direction of the flow of the extinguishing agent. See photo below.

▼ Lavatories fire extinguishing bottles.



▲ Engine fire extinguishing operation.

These auto-discharge bottles have to be removed or weight checked generally every year and they also have a limited life span after which they will be discarded.

Cargo Compartment fire extinguishing operation

Generally there are two fire extinguishing bottles for aircraft cargo compartment (for example: E190, A320, B767 etc).

Some old aircraft designs, for example FOKKER 100, did not have the suppression system installed in the cargo compartment, this means, neither has fire detection nor fire extinguishing, but to comply with new requirements from FAA/EASA/ANAC and others, the operators of Fokker 100 had to embody the suppression system. It happened around 2005. Nowadays the new projects must born with fire

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▲ Lavatory fire extinguishing bottle.

suppression in the cargo compartment, for example, the new design like A350, E190E2, B787 etc.

When smoke/fire is detected in cargo, initially the pilots discharge the first bottle which completely fills the affected cargo with Halon gas, then after that they deploy the second bottle. This second bottle releases the Halon in a controlled manner in order to keep the Halon concentration around 3%. This concentration of 3% to keep the oxygen out takes around 1h or more depending on aircraft certification.

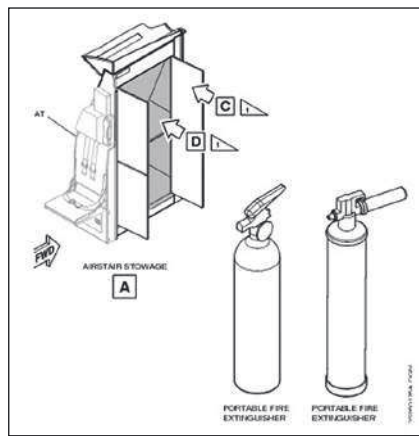
In the meantime, the pilot has requested permission to land urgently at the closest airport.

Cargo Compartment classification regulations

In order to establish appropriate requirements for fire protection, a system for classification of cargo or baggage compartments was developed and adopted for transport category airplanes. Classes A, B, and C were initially established; Classes D, E, and F were added later. Class D has since been eliminated from the regulations. The classification is based on the means by which a fire can be detected and the means available to control a fire.

A Class A compartment is located so close to the station of a crewmember that the crewmember would easily discover the presence of a fire. In addition, each part of the compartment must be easily accessible so that the crewmember could quickly extinguish a fire with a portable fire extinguisher. A Class A compartment is not required to have a liner.

A Class B compartment is accessible in flight but more remote from the crewmember's station than a Class A



▲ Portable fire extinguishing bottles.

compartment must, therefore, incorporate a smoke or fire detection system to give warning to the pilot or flight engineer station. Because a fire would not be detected and extinguished as quickly as in a Class A compartment, a Class B compartment must have a liner. In flight, a crewmember must have sufficient access to a Class B compartment to effectively fight a fire in any part of the compartment with a hand fire extinguisher when standing at the compartment's one designated access point, without stepping into the compartment. Therefore, Class B cargo compartments are limited to the main deck. There must be means to ensure that, while the access provisions are being used, no hazardous quantities of smoke, flames, or extinguishing agent will enter areas occupied by the crew or passengers.

A Class C compartment differs from a Class B compartment in that it is not required to be accessible in flight and must, therefore, have a built-in fire extinguishing or suppression system that is controllable from the flight deck. A Class C compartment must have a liner and a smoke or fire detection system. There must also be means to exclude hazardous quantities of extinguishing agent and products of combustion from occupied areas.

A Class D compartment was one in which a fire would be completely contained without endangering the safety of the airplane or the occupants. A Class D compartment was not accessible to a crewmember in flight, and instead of providing smoke or fire detection and extinguishment, Class D compartments were designed to control a fire by severely restricting the supply of available oxygen. Due to several uncontrollable fires in Class

D compartments, they were eliminated. Class D cargo compartment standards pre-dating Amendment 25-93 are inadequate. Therefore, the FAA does not approve new Class D cargo compartments even in airplanes with a certification basis pre-dating Amendment 25-93.

A Class E compartment is found only on an all-cargo airplane. Typically, a Class E compartment is the entire cabin of an all-cargo airplane; however, other compartments (e.g., lower-deck, inaccessible cargo compartments) of such airplanes may be classified as Class E compartments. Shutting off the ventilating airflow to or within the compartment controls a fire in a Class E compartment. A Class E compartment must have a liner and a smoke or fire detection system installed. It is not required to have a built-in fire suppression system.

A Class F compartment must be located on the main deck of the airplane. Class F compartments must have means to control or extinguish a fire without requiring a crewmember to enter the compartment. Class F compartments that include a built-in fire extinguishing/suppression system or require the use of fire containment covers (FCCs) or fire resistant containers (FRCs) meeting the criteria identified for these components.

FAA introduced the Class F cargo compartment as a practicable and safe alternative to the previous practice of providing large Class B cargo compartments. Class B compartments are limited to the main deck for accessibility reasons. Likewise, Class F cargo compartments must be limited to the main deck for accessibility. All lower-deck cargo compartments in airplanes carrying passengers must comply with the Class C cargo compartment.

Portable fire extinguishing operation

The portable fire extinguishers are used by crews (pilot and flight attendants) to extinguish any fire in the cockpit and passenger cabin. Some executive aircraft whom baggage compartment is accessed from passenger cabin also use the portable fire extinguishers for fire suppression.

For more information, go to www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.information/documentNumber/25.857-1

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UL offers online tool for testing of fire sprinklers sampled from buildings

For several decades, UL has provided a testing service to assess the operating characteristics of fire sprinklers sampled from sprinkler systems in existing buildings.

UL's online tool that makes it easy for the user of these services to request testing.



Kerry M. Bell

Sprinkler System Inspection, Testing and Maintenance

For more than a century, fire sprinklers have proven to be an extraordinarily effective tool for protecting life and property from fire. While it is critical that these systems be properly designed and installed, it is equally important for these systems to be periodically inspected, tested and properly maintained. The National Fire Protection Standard (NFPA) Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, NFPA 25 contains detailed inspection, testing and maintenance requirements for fire sprinkler systems. While the focus of this article is on the examination and testing of the sprinklers sampled from the system, this standard is comprehensive in that it includes requirements for all components of a fire sprinkler system. As indicated in NFPA 25, the responsibility for properly maintaining a sprinkler system resides with the owner of the property.

Periodic inspection of field-installed sprinklers is an important element of a comprehensive maintenance program for sprinkler systems. As specified in NFPA 25, sprinklers showing signs of leakage, field painting, damage, unacceptable corrosion or loading are to be replaced. All of these conditions can lead to the degradation of sprinkler performance during a fire condition.

In addition to the periodic inspection of field-installed sprinklers, NFPA 25 also requires replacement or representative sample testing of sprinklers based upon length of service. The frequency of sample testing or replacement depends upon the sprinkler type and installation environment. For example, while many sprinklers do not require testing until they have been in service 50 years, quick

response sprinklers are required to be tested after 20 years in service and 10-year intervals thereafter. Due to the relative complex construction of a dry type sprinkler as well as the anticipated aggressive installation environments for many of these sprinklers, dry type sprinklers required to be tested after 10 years of service and 10-year intervals thereafter. It is also noteworthy to highlight the fact that NFPA 25 indicates that sprinklers installed in harsh environmental conditions are to be replaced or representative samples tested on a 5-year basis.

Request for Operational Testing

UL's program for conducting operational tests on sprinkler samples removed from field installations is intended to assist property owners and other interested parties in assessing the operating characteristics of sprinklers in service. The recent introduction of UL's online tool for requesting operational testing of sample sprinklers provides a quick, simple means for initiating this process. This tool can be accessed by visiting UL's website at www.ul.com/fieldsprinklertesting. Following the menu prompts provided within the tool, basic information on the submittal is requested.

As a part of UL's field sprinkler testing service, identification tags are available for use at no charge. Sprinkler samples submitted for testing should be identified with the name and address of the building's occupant, type of room environment (office, warehouse, factory, etc.), location of the sample within the building and information on the party submitting the samples for testing. These identification tags can be requested online as well. A photograph of the sprinkler sample identification tag is shown in Figure 1.

Sprinkler Sample Selection and Testing

The samples selected for testing are to be representative of the sprinklers installed in the system. As noted in NFPA 25, no less than four samples, or one percent of the number of sprinklers per individual sample, whichever is greater, are to be tested. Since UL's operational testing of sprinklers is destructive, the sprinkler samples removed from the system for testing need to be immediately replaced with new sprinklers.

Each sample received by UL is visually examined before testing to ascertain the sprinkler manufacturer, model or sprinkler identification number, style, type of heat responsive element, temperature rating and year of manufacturer. The condition of the sprinkler is also noted based upon visual evidence of corrosion, loading, leakage, mechanical damage or field painting.

The testing of the sprinklers involves an assessment of the ability of the sprinkler to operate as intended. To conduct this assessment, sprinkler samples are subjected to the Sensitivity-Oven Heat Test as described in the Standard for Automatic Sprinklers for Fire Protection Service, ANSI/UL 199. During this test, the inlet of the sample is pressurized to approximately 5 psig and quickly plunged into an oven that circulates air at a constant temperature and velocity. The actual temperature and air velocity used for the test is selected based upon the temperature rating of the sprinkler. Each sprinkler sample is observed for proper operating characteristics including the release of operating components and time of operation. A diagram of the test oven apparatus is provided in Figure 2.

The UL report of the testing, provided to the submitter of the samples, describes the condition of each sprinkler and results of the operation test as either normal or abnormal. The as-received condition of each sprinkler sample described in the report is based upon UL's visual examination. The information included in UL's report is intended to be considered by other parties in determining whether or not other sprinklers within the system require replacement.

Summary

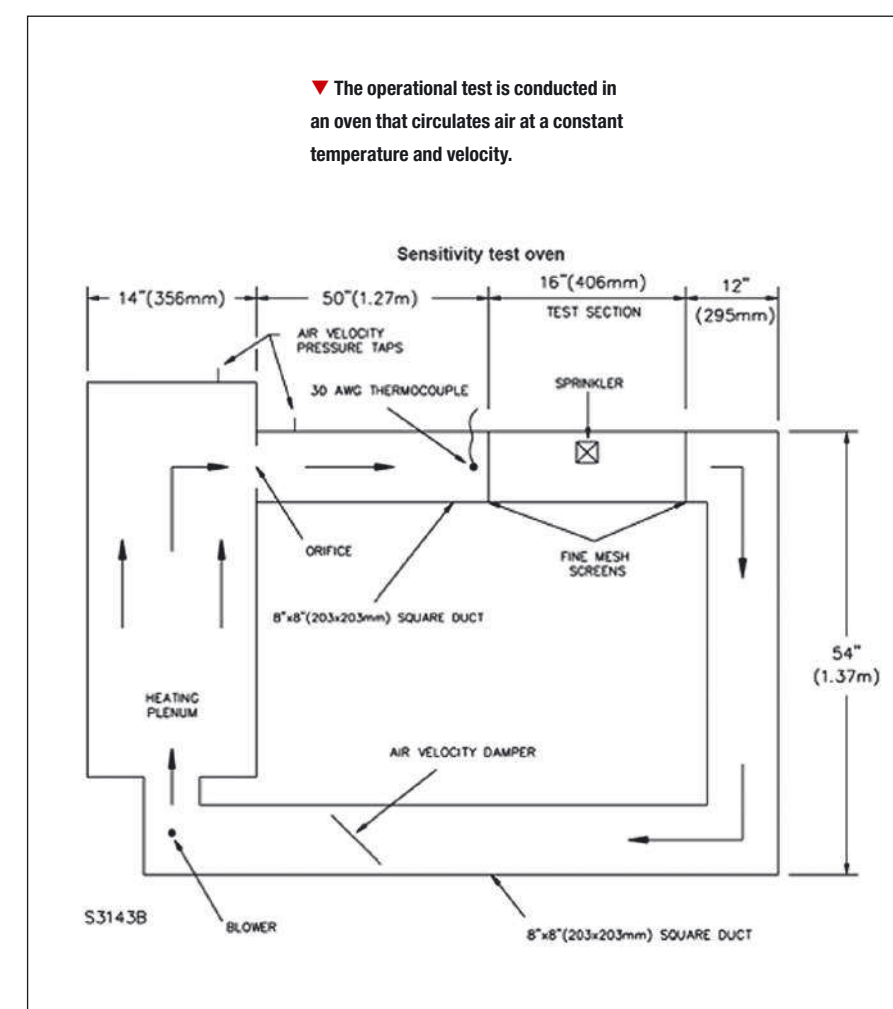
While proper inspection, testing, and replacement (as needed) of the sprinklers is only one aspect an effective maintenance program for a fire sprinkler system, it is

an important element. The operating characteristics of sprinklers can degrade over time and an effective means to assess the operating characteristics of field installed sprinklers is to conduct representative sample testing. As required in NFPA 25, this testing is to be conducted by a recognized testing laboratory acceptable to the authority having jurisdiction. UL's program for testing sprinklers sampled from systems

▲ Sprinkler sample identification tags are available from UL free of charge.

is intended to be a valuable tool to assist property owners, inspection authorities and the insurance industry in making important assessments.

▼ For more information, go to www.ul.com



Grounding of corrugated stainless steel tubing does not prevent fires

Corrugated Stainless Steel Tubing (CSST) is a semi-flexible gas tubing favored over traditional black iron pipe because it reduces installation time and requires fewer fittings. However, the thickness of CSST is approximately 10 times thinner than traditional black iron pipe, making it more susceptible to perforation when assaulted by lightning. Over the past decade there has been concern over the fire safety of CSST when exposed to lightning with some local fire marshals banning the use of CSST in their jurisdictions.



Thomas W. Eagar
Bryan Haslam
Donald Galler

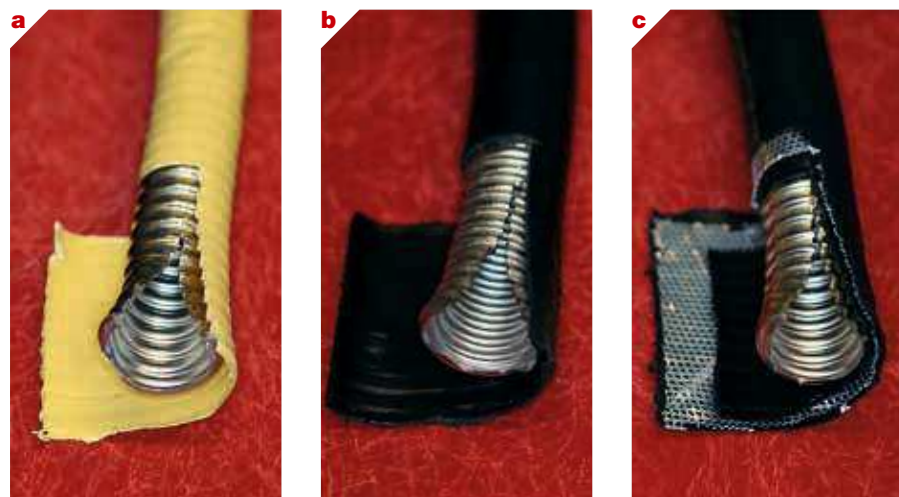
Thomas W. Eagar has been a Professor of Materials Engineering at MIT in Cambridge, MA for 40 years. He has investigated dozens of fires and explosions using his knowledge of metallurgy, arc physics and thermodynamics.

Bryan Haslam is a Ph.D. candidate in Electrical Engineering and Computer Science at MIT.

Donald Galler is a licensed Professional Engineer working at MIT. His specialty is Electrical Engineering and has worked on many failure investigations.

The original CSST had a yellow polyethylene jacket which is electrically insulating and actually exacerbates the problem of lightning-induced fires. After more than a decade and numerous fires, manufacturers developed black conductive jackets that help dissipate the lightning current that was creating holes in the CSST. There were still 6,000,000 homes with more than 1,000,000,000 ft of the original yellow CSST though. So in 2006 manufacturers added an installation requirement to connect CSST to the electrical grounding system with a bond wire in an effort to prevent damage from lightning. This grounding requirement was adopted into the National Fire Protection Association

▼ Three types of corrugated stainless steel tubing (CSST). The type on the left was exclusively sold for almost 15 years before the two types on the right were developed to help prevent lightning-induced fires.



(NFPA) 54 Fuel Gas code, was promoted by the National Association of State Fire Marshals and the United States Senate.

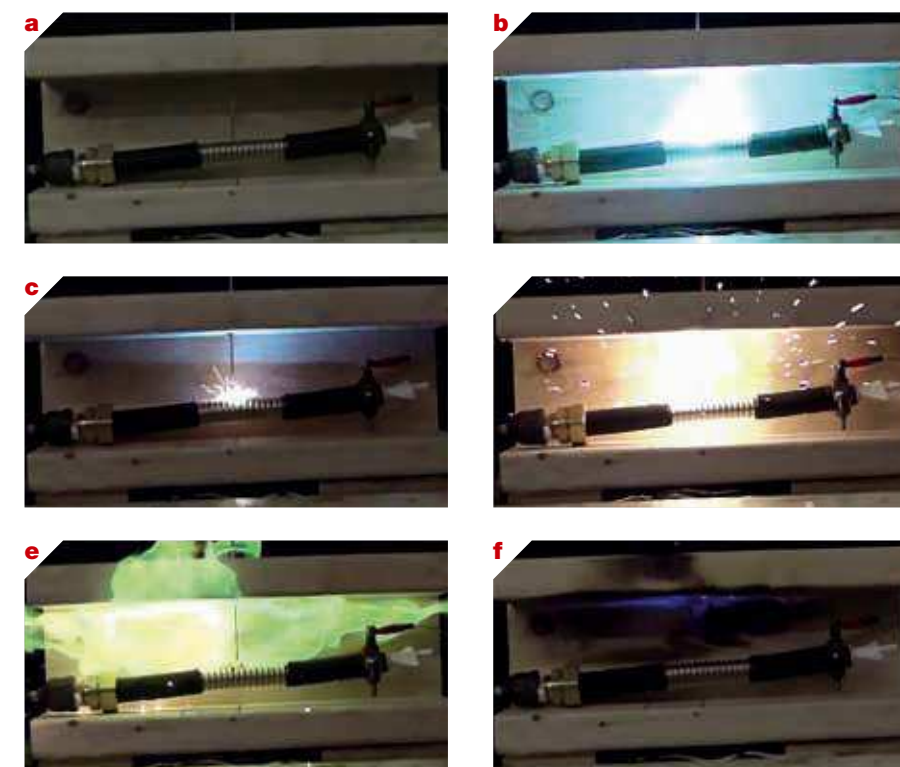
Nonetheless there continued to be damage from lightning and the NFPA requested further information concerning grounding of CSST. In 2013 reports commissioned by the CSST manufacturers were released which included limited physical testing and circuit simulations to extend the conclusions to practical installations. The reports concluded that grounding was sufficient to prevent perforation of the CSST by lightning and therefore prevent fires.

The recent study described in this article extended the work of those reports to several more practical scenarios than the ones included in the manufacturers' reports. The study was conducted by a team of metallurgists and electrical engineers at MIT and was published in the peer-reviewed journal Fire Technology. The following provides an overview of the study.

Fire hazard of CSST when assaulted by lightning

A lightning strike carries an enormous amount of high frequency current. Such a current on an electrical conductor results in a voltage on the conductor and if there is a grounded object nearby, will lead to an electrical arc. When the lightning current goes through the arc it is concentrated and the heat can melt the conductor. Field reports from lightning-induced fires show CSST with holes melted at locations near another grounded conductor. The authors tested an arc on CSST filled with gas as seen in the pictures showing (a) the test setup (b) an electrical arc between the CSST and another conductor (c) metal spatter near the arc location (d) metal spatter flying away from arc location (e) gas burning as it escapes from CSST and (f) sustained burning of the gas. This test demonstrates that a sufficient electrical arc between CSST and another conductor can cause a fire. Lightning has enough energy to create such holes, but the question is if grounding the CSST is enough to reduce the amount of energy and prevent perforation and therefore fires.

▼ There are multiple methods lightning current can enter a structure and many possible locations it can enter.

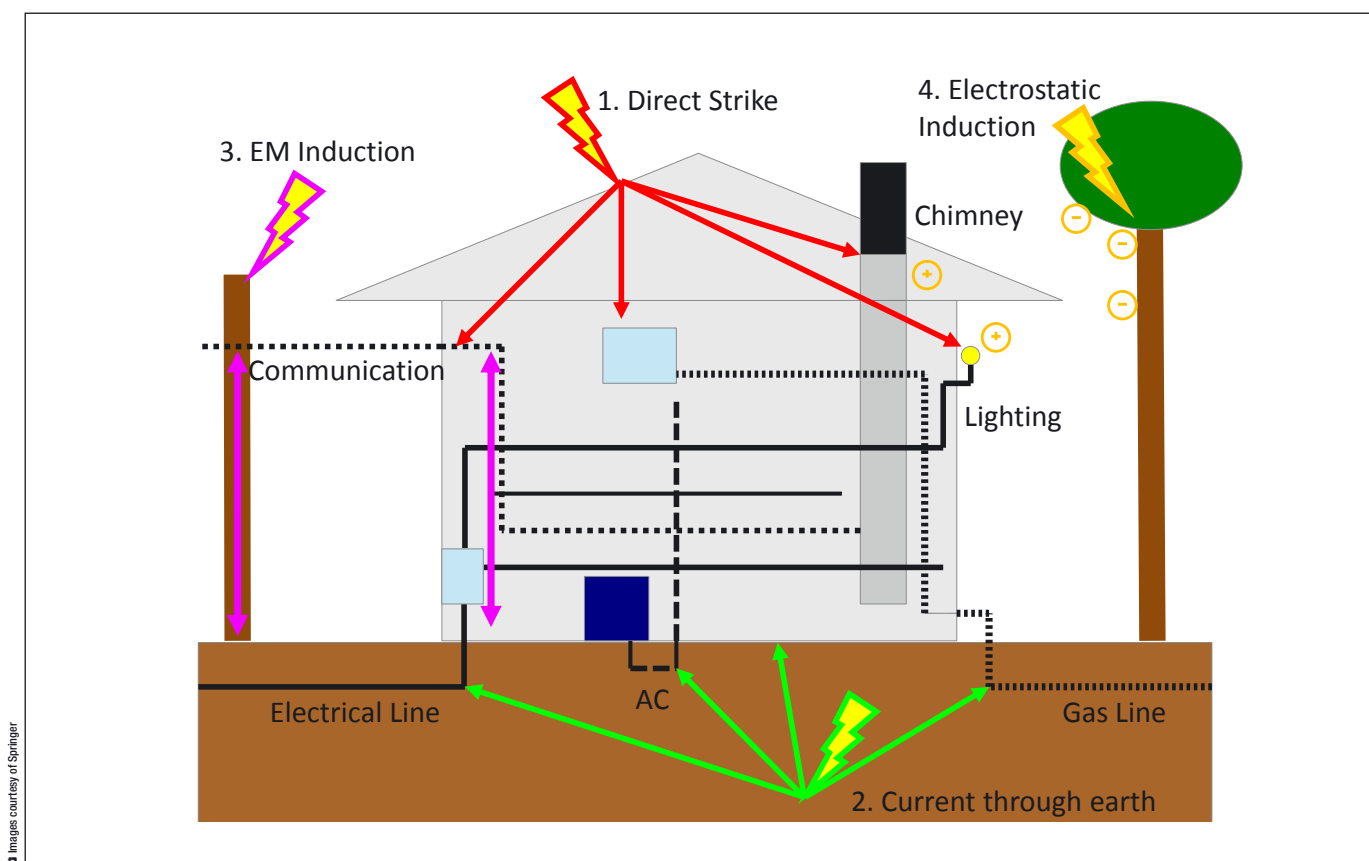


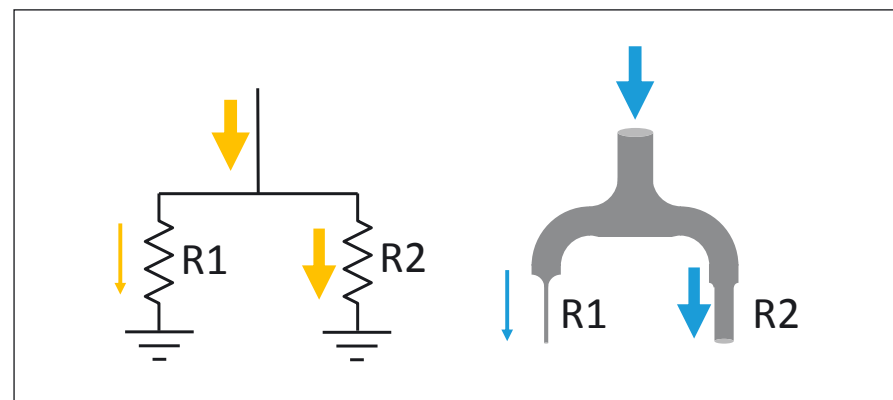
Simulations of lightning current in a home

The study reports on testing at Lightning Technology Inc. to confirm the thresholds for arc initiation and melting. The authors used circuit simulations as done in the reports previously commissioned by the manufacturers and reproduced their results

▲ Sequence of photos showing an electrical arc to CSST which melts a hole and ignites the escaping gas.

for the limited scenarios they simulated. They then extended the simulations to include more locations where lightning could enter a structure and extended the ranges of simulation parameters to include





▲ The amount of electrical current through different paths depends on the resistance of the paths. This is analogous to water flowing through pipes with different resistances.

more realistic situations. These parameters included the impedance of conductors and the current of the lightning.

There are many ways lightning can enter a structure as shown in the second figure. A direct strike is where lightning directly enters a conductor that is part of the structure. Lightning could also strike near the structure and current through the ground could enter a conductor connected to the structure. It is also possible for lightning to strike nearby and induce a current in

▼ With enough charge through an arc (the black dotted line), a hole is melted in the CSST. These simulation results for an indirect lightning strike entering an outdoor lightning structure show that without grounding a hole is unlikely, but with grounding a hole is likely.

the structure or arc to a conductor in the structure. The authors simulate lightning entering in several different locations. They also vary the current to simulate a direct strike or a weaker indirect strike.

The authors also varied the impedance parameters within the circuit because the lengths of wires, CSST and other conductors will vary depending on the structure. The earth ground of the CSST or the electrical line buried outside the structure will also vary. Electrical impedance is important because it determines how much current flows. This is analogous to water pipes where a narrower pipe will have larger resistance and less water will flow through it. In the diagram above, more electrical current will flow through the resistor with impedance R2 just as more water will flow through the pipe with resistance R2.

The reports commissioned by the CSST manufacturers used a limited set of impedance parameters and only considered lightning entering through the gas line or the electrical line.

Grounding can actually increase fire risk

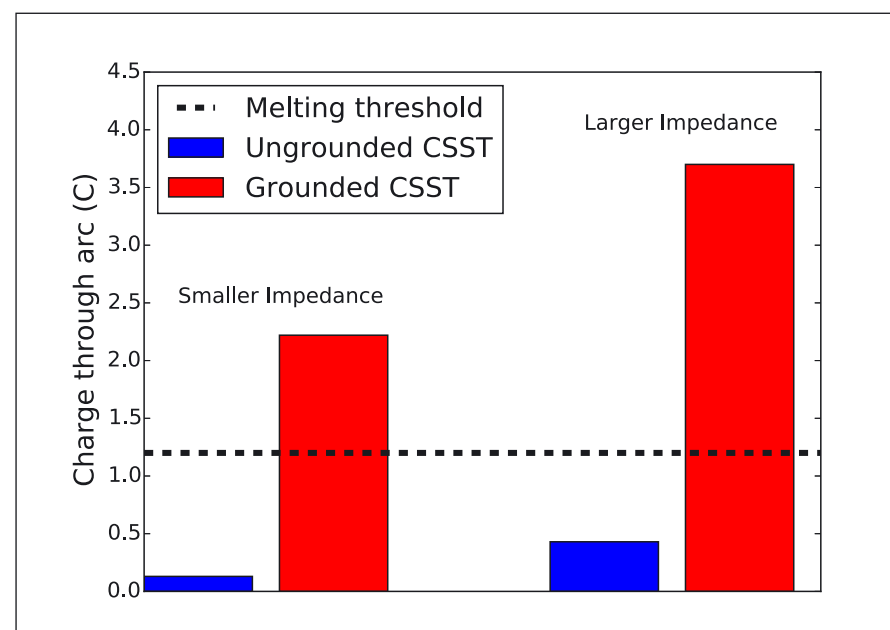
The voltage threshold of an arc is approximately 25 kV for CSST. The simulations from the study showed that even though grounding helped reduce the voltage in many cases, it was not sufficient to prevent arcing for lightning entering many of the locations simulated. The voltage was largest when the impedance in the structure was large and when the lightning current was stronger.

In simulating the current through the arc, there were some cases where grounding increased the charge through the arc and increased the risk of fire. The plot below shows the simulation results of a moderate indirect strike entering the house through a lighting structure on the outside of the house. The charge through the arc determines if a hole is created in the CSST. The authors demonstrated that 1.2 Coulombs of charge was sufficient to create a hole. An average lightning strike has 5 Coulombs, but the top 1% of strongest lightning strikes have approximately 700 Coulombs. In this situation, without grounding, the charge is below the threshold while with grounding the charge is above the threshold. The problem gets worse when some impedances inside the structure are increased, as in the case of longer electrical wiring.

The authors argue that this intuitively makes sense because grounding the CSST essentially turns it into a lightning rod. A case in Lubbock TX where a person died in a house fire where CSST was grounded may be explained by these results.

The study concludes that grounding is often insufficient to prevent an arc. It further concludes that when an arc forms between CSST and another conductor, the factors that determine whether or not there is enough charge to create a hole in the CSST and start a fire depends on the electrical grounding, the impedances of conductors in the structure and where the lightning enters the structure. Depending on these factors, grounding may or may not help and in some cases may make things worse. Complete results and conclusions are published in Fire Technology.

For more information, go to <http://link.springer.com/article/10.1007/s10694-015-0557-z>



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Driving development in fire suppression

We live in a world dominated by the impact of safety, both in terms of maximising life protection and reducing potential impact on the environment. Safety has risen to the top of many executive agendas, and its emergence as a critical business concern drives everything from workplace culture, to reduced business risk and the avoidance of unnecessary and costly operational downtime.



Alan Elder

Protecting against fire risk plays a vital role in this safety-first approach, and the factors influencing the design, specification and use of fire suppression systems is changing. Typical considerations, such as effectiveness of the system and agent, cost of ownership, and health and safety, remain key aspects of the selection process. Added to this is the impact of changes in environmental legislation and the greater effect these will have on the fire suppression industry, and subsequently the system choice available to fire safety engineers and system designers.

▼ The iFLOW nozzle.



Image courtesy of Tyco Fire Protection Products

Understanding the impact of legislative change

While the influence of environmental regulation is unavoidable, and tighter controls of harmful substances and materials should be encouraged, it is vital to consider the holistic effects of significant change to the fire suppression industry. Regulatory change translates into modifications, and sometimes transformations, of the solutions available to the market. In March 2014, the European Parliament supported a European Commission proposal to reduce the use of hydrofluorocarbons (HFCs) and greenhouse gases as part of the F-gas Regulation. This requirement to cut HFCs to 79% below average 2009-12 levels by 2030 was mandated effective from January 2015, with phase-down commencing from January 2016. Fire suppression systems are directly impacted by this regulation, particularly those using HFC-based extinguishing agents, as they have some of the highest global warming potential (GWP) in comparison to other sectors.

Given that some fire suppression systems have a service life of 20 years, it's likely that older installations were designed with HFCs. Any HFC-based system already in-situ is also affected by the F-Gas regulation, including system recharging. This directs a disproportionate impact on fire suppression system owners, who not only face price increases as a result of limited HFC availability, but also must be aware of potential end-of-life and decommissioning costs of their existing systems when a suitable alternative must be installed.

One perspective in the fire suppression market is that the impact of the F-gas regulation can be dismissed as no HFC emissions are released unless the system discharges in the event of a fire. However, this does not represent an accurate interpretation of the F-gas requirements, as the regulation focuses on reducing HFC emissions by controlling the use, and therefore minimising the manufacture and sale of such products.

As the fire suppression market evolves and moves forward, there is a drive for innovation and technology development that supports viable alternatives to HFCs. The complexity of engineered fire suppression systems requires a robust and reliable solution that is matched to the application risks and takes into account the specific considerations in relation to pipework design, venting and storage of the extinguishing agent containers. Working with fire suppression system manufacturers who offer a wide range of products ensures that system designers can benefit from impartial guidance on the most effective suppression method for their particular application.

Viable options for effective fire suppression

Even before the introduction of the F-gas Regulation, fire suppression solutions using inert gases have long provided an effective alternative to HFC-based and halon systems. These solutions combine three primary gases – nitrogen, argon and carbon dioxide – to deprive the fire of oxygen and eliminate the potential for combustion. Inert gases displace a significant amount of the atmosphere within the protected space in order to suppress a fire. A typical atmospheric composition is approximately 21% oxygen, 78% nitrogen and a 1% blend of carbon dioxide, methane, helium and trace amounts of other gases. For inert gases to successfully control a fire, the oxygen level must be lowered to 15% or less, requiring 35-50% of the atmospheric volume to be replaced within a discharge time of 60 or 120 seconds. This change to the atmospheric conditions in the space requires appropriate venting to exhaust ambient atmosphere and release the inert gas on suppression of the fire, and presents one of the most significant challenges

Innovation in inert gas fire suppression

Overcoming the key design and engineering challenges of inert gas fire suppression systems is the stimulus for new, innovative technologies that can improve performance and reduce costs for system owners. To support this industry improvement, Tyco Fire Protection Products has developed its unique iFLOW delivery system for inert gas fire suppression systems.

The iFLOW system provides regulated discharge pressure to eliminate the potential for flow spikes and peak pressure. This controlled flow of the inert gas enables smaller diameter, lower pressure pipework and reduced pressure relief venting to help design engineers minimise complexity in their system, and therefore unnecessary pressure venting costs.

Using three innovative components that combine as part of an integrated fire suppression system – the iFLOW valve, the iFLOW horizontal check valve and the matrix container racking system – engineers can design out additional ancillary components, such as orifice plates and manifolds, and achieve a more effective and less complex fire suppression solution.

The iFLOW valve regulates flow at nominal pressures of 60 bar (in a 300 bar system) and 40 bar (in a 200 bar system). It reduces the peak pressure spike associated with conventional orifice systems and achieves 95% of the design concentration within 60 or 120 seconds as required by recognised industry standards. The iFLOW valve also limits the output pressure, even in the event of a discharge occurring against a closed selector valve, making it one of the safest valves on the market. The iFLOW check valve connects multiple containers and can eliminate the need for a discharge manifold on certain systems, to help minimise installation time.

The challenge of designing fire suppression systems within complex spaces, either as part of a new construction project or a retro-fit to an existing building, can impact on the layout of the container bank, leading to more complicated installations. iFLOW overcomes this with the matrix container racking system that offers greater flexibility and options for the container layout. This provides greater choice when systems have to be installed in tight spaces. When compared with traditional racking systems,

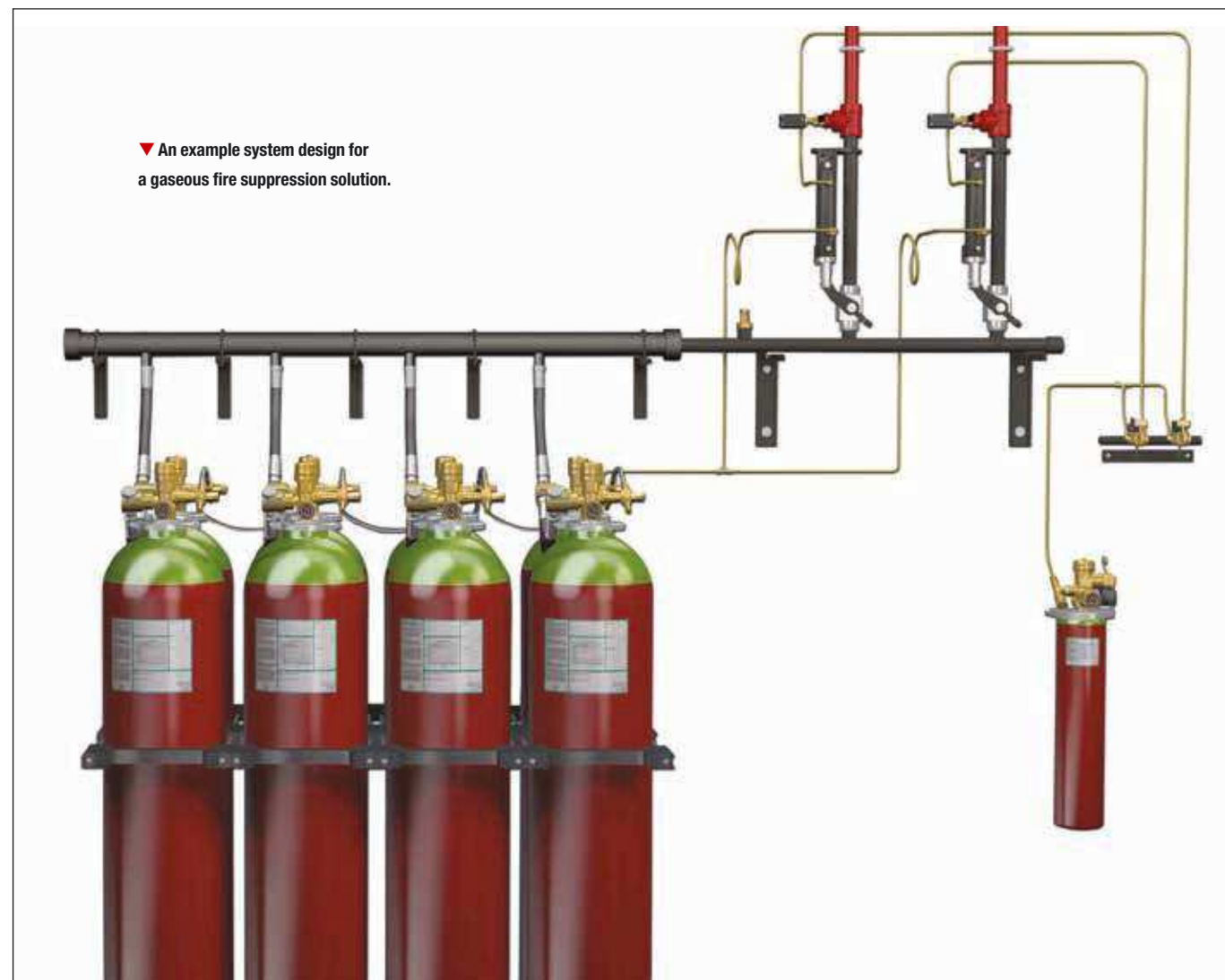
▼ The gaseous suppression system with iFLOW nozzle.



the matrix design enables containers to be positioned in conventional rows or even arranged around columns to fully utilise available space, and also facilitates quicker removal of containers during recharge and maintenance.

The controlled flow discharge performance offered by iFLOW is a new innovation in engineered fire suppression and represents a significant change to how engineers can design and install robust and reliable systems, while overcoming the challenges of total flooding solutions. The iFLOW Fire Suppression System was developed through extensive testing, and is certified and approved with recognised bodies, including VdS, UL and FM.

Alan Elder is a Tyco Fellow – Engineered Systems, Tyco Fire Protection Products.



▼ An example system design for a gaseous fire suppression solution.

to system designers when engineering a gaseous fire suppression system.

Conventional inert gas systems can cause potential over pressurisation, resulting in collapsed walls, blown out doors and damage to a building's structure, particularly in enclosed spaces such as data centres, electrical control rooms and laboratories. This is a result of the initial flow spike and peak pressure during initial discharge of the inert gas, and it is this pressure data that determines the specification of the system pipework and venting. To further reduce the risk of over pressurisation, larger size and high-pressure pipework based on hydraulic calculations defined by the system storage pressure is required, which can increase the complexity, cost and installation time of the fire suppression system.

To maximise the amount of inert gas within a specific system, the agent is stored in pressurised containers at up to 300 bar. This storage pressure differs across regional markets and is influenced

by varying factors, with the typical storage pressure in Europe at 300 bar, 150-200 bar in the US, and 200 bar in the Middle East. In the US market in particular, storage pressures are lower than those in Europe due to the infrastructure that supports the refill of gas containers restricted to the 150-200 bar pressure range. The storage containers are the most expensive component in an inert gas fire suppression system, so designing a system at the highest storage pressure possible reduces the number of containers required to hold the inert gas. The current 300 bar inert gas fire suppression systems are maximising the capability of existing gas container design, and additional ancillary components such as orifice plates and manifolds are required in certain system designs.

Client to confirm following queries/ provide additional briefing information;

- Are we looking to elaborate further on clean agents specifically within this section?

- What are the additional key customer/market challenges that we can highlight?
- What further trends does Tyco FPP see in relation to engineered fire suppression systems?

Time for a change

The shift in market dynamics within the fire suppression industry has increased the use of alternative systems to reduce the reliance on HFC and halon-based agents. Product development and innovation form a key part of this transition. It is experienced manufacturers, such as Tyco Fire Protection Products, working closely with industry associations and standards authorities, who are helping to drive the trend towards more effective, 'greener' fire suppression technology.

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Written by Fire Professionals for Fire Professionals

Plumis's automist smartscan testing

A common denominator linking manufacturers of reliable, trustworthy, quality-controlled construction products is independent third-party testing. Before taking their products to market, these manufacturers invest in the help of independent third party laboratories, such as fire protection testing specialist Exova Warringtonfire, to negotiate a complex labyrinth of research, development, assessments and testing.

One such manufacturer is Plumis, the James Dyson Award-winning inventors of the Automist active fire protection concept and manufacturers of a small range of innovative products that propelled them to be named Innovators of the Year by the CBI in 2014.

Their latest product, the Automist Smartscan, is an elegantly engineered, water-saving, efficient, affordable and highly effective sprinkler replacement. It uses an under-researched technology – water mist – in a new way to provide active fire protection in the home. Such is the innovation of the product's design, it has already gained international recognition with an award for the best "interior design elements" product in the renowned Red Dot Design Awards 2016.

The story of how Exova Warringtonfire collaborated to test the Smartscan to be accepted in the UK market is a parable of persistence, commitment and belief in marginal gains.

Scene Setting

Passionate about their product, Plumis understood their responsibility to ensure that it worked and met all the relevant product standards. And after all, compliance with recognised standards is what their market looks for, especially the approving bodies.

They rapidly discovered, however, that the Smartscan falls outside the prescriptive scope of the then draft but now published BS 8458:2015 Fixed fire protection systems. Residential and domestic watermist systems. Code of practice for design and installation.

Alarmingly, they had no standard to comply with. There are water mist standards that come close in other sectors and for other applications, and of course there are generic fire tests of various kinds, but no product standard for their particular specification. Although they could still test the Smartscan to BS 8458's performance standards, they could never claim that it complied. Theirs was an orphan product.

While this in no way damped their commitment to safety, fitness for purpose, or quality, it did make life awkward.

The residential specifier market in the UK – the people they want to buy the product – is diverse. The volume housebuilders are more demanding than private domestic homeowners, but with appropriate marketing the lack of a standard to comply with is not an insurmountable obstacle.

On the other hand, the people who would allow the product to be used – building control officers, fire officers and local authority inspectors – are just as important to commercial success but trickier to persuade. They are the gatekeepers to wide-scale acceptance.

For them, approval is loaded with the deadweight of liability, particularly for life-critical products like the Smartscan. By

▼ BS 8435:2015 Test 1 – Room corner (Spray head on opposite wall).

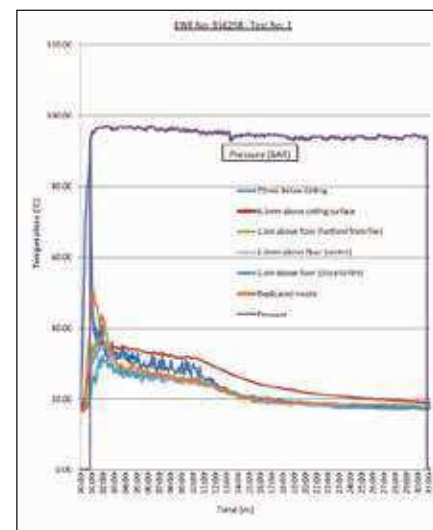


Image courtesy of Exova



Image courtesy of Exova

whipping the safety net of compliance out from under their feet they are left with no convenient shortcut to unburdening this liability.

This was a concern for Plumis, and set them on a heroic, comprehensive programme of testing with Exova Warringtonfire that, with no irony intended, sets new standards for orphan products.

What Is It?

Their Automist Smartscan product is an active fire suppression system, a reliable replacement to a water sprinkler. The concept uses water mist – an increasingly popular, highly effective fire suppressant in many circumstances – to either extinguish fires or suppress them long enough to allow people to escape safely and firefighters to attend.

Water mist has a large surface area and so quells the heat produced in a fire more efficiently than sprinkled water. As it reaches the seat of the fire, it starves it of oxygen. By keeping the ambient temperature comparatively low, it prevents or delays flashovers.

Its USP and appeal

Powered by an isolated electrical circuit, the Smartscan comprises a natty high-pressure pump and, uniquely for a water mist system, a single wall-mounted, swivelling misting nozzle. This nozzle is fitted with an automatic infrared heat detector that targets the source of a fire reliably and very accurately, limiting water damage – a major attraction for owners, occupants and insurers alike.

Wall-mounting instead of ceiling-mounting is no fanciful whim either.

Shooting water mist sideways avoids the super-hot evaporative upper layers under the ceiling, allowing mist to reach the seat of the fire sooner.

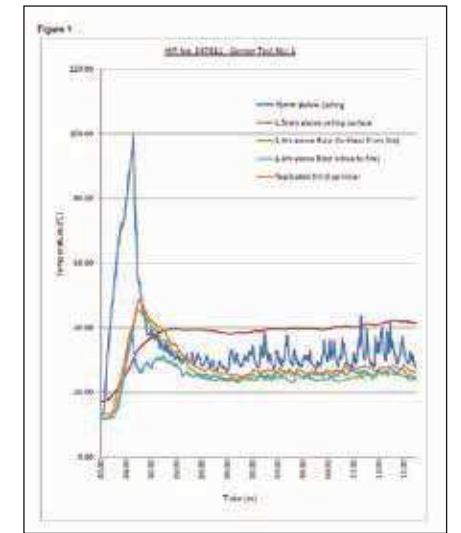
Unlike sprinklers or conventional water mist systems, it uses less water, requires less supporting infrastructure and is thus more easily retrofitted.

Its use

While suitable for all residential newbuild or refurbishment projects under ten storeys, the Smartscan comes into its own during domestic retrofit. In particular, it allows you to overcome the constraints imposed by the Building Regulations when converting a loft. The consequence of going into the loft above first floor level is that you need to preserve a protected escape route out of the house, compromising aspirations for open-plan layouts on the ground floor.

Before the Smartscan (and Plumis's LABC-approved multi-nozzle product, also in the Automist range), design options in this common scenario were limited. You either had to retrofit a ceiling-mounted sprinkler system at vast expense and much disruption, devise a validated fire engineering solution (again at considerable expense), or build the protected escape route separating the stairs and corridor to the outside from the rest of the ground floor.

Now, though, the Smartscan offers a fourth way. Orders of magnitude more affordable in certain situations, installing it into an existing house or other residential settings is straightforward. Better still, it stops people being tempted by the dummy wall solution, improving fire safety generally.



▲ BS 8435:2015 Test 2 – Room corner (Spray head on same wall).

The challenge

The benefits of the Smartscan are apparently numerous and self-evident. At least, that was Plumis's hope. Like all responsible manufacturers facing a stiff regulatory landscape in their target market geographies, to be taken seriously Plumis needed independent verification of their claims and third-party testing. Only then could they hope to evolve to widespread acceptance from the approving authorities and specifiers.

The route to market

They naturally turned to Exova Warringtonfire as the reputable partner in their product development, and the two companies worked together to create a dedicated water mist testing facility in an existing concrete block-lined spray-room. This is now a permanent facility open to all manufacturers.

From an initial programme of eight test sessions, it quickly became apparent that more was needed to plug the confidence gap. Much more. Indeed, Plumis are now into their 80th round and counting. What's more, Exova Warringtonfire is now very experienced at testing to BS 8458.

Testing, testing

The development of the Smartscan was no ordinary road. It received seed money worth £160K from the Technology Strategy Board (now called InnovateUK) to type-approve it with the objective of making it as good as or better than a sprinkler system.



▲ BS 8435:2015 Test 3 – Centre
(Spray head on opposite wall).

Early fixed-head prototypes were developed with the help of computational fluid dynamics modelling by the University of Greenwich's Fire Safety Engineering Group. It became apparent that to maximize its reach, the water mist would have to be sprayed in an axehead blade.

The most obvious orientation, a fixed wall-mounted horizontal blade, wasn't working well enough in standard tests conducted by Exova Warringtonfire. Although it was good at avoiding evaporative losses and thus reaching the seat of the fire more quickly, it was still outperformed by sprinklers. Plumis were advised that the problem was that not enough water mist was reaching the target.

With countless trial-and-error iterations under their belt, the penny finally dropped. To deluge the fire appropriately, the axehead blade should be vertically oriented. This was a eureka moment, proving that it was possible to match the performance of water sprinklers – but only up to a point. (See pic 2 and graph 1 below)

A vertical blade would work on fires that happened to be in the path of the spray, sure, but what about fires slightly to one side?

Although this was another challenge for Plumis, the vertical orientation breakthrough held enough promise to push them on to further testing at Exova Warringtonfire. A smart move, as it turned out.

The solution was staring them in the face. The misting nozzle would have to be able to detect the source of the heat and then swivel accurately and reliably to target the fire before activation. (See Pic 3 below) This is harder than it sounds. Early prototypes of the infrared sensor were confused by hotspots away from the seat of the fire.

A good many months and many tests on and with countless prototypes consigned to the scrapheap, the Automist Smartscan was born. Thanks to Exova Warringtonfire's third-party testing regime, the infrared heat detector mounted on the nozzle head proved a suitable sprinkler replacement, more than matching the performance standards set out in BS 8458. (See results graphs 2- 4 below)

Aware of the need for evidence,

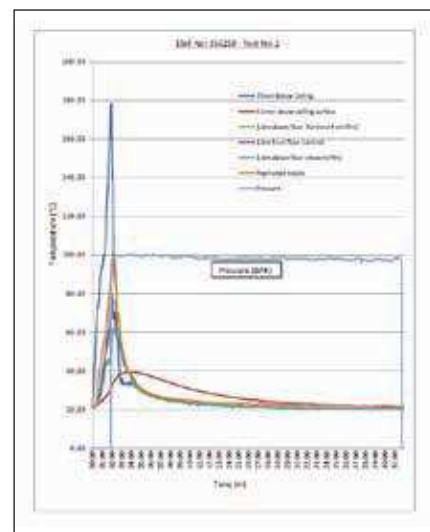


Image courtesy of Exova

Plumis have pushed the Smartscan's limits beyond the bare minimum, challenging it in many additional tests to suppress or extinguish fires in any position (even difficult fires obscured or hidden by furniture) and in a variety of draught conditions.

Demonstration tests have convincingly proved its worth time and time again. It has even travelled to the USA, where the UL 1926/2167 listing process is being kicked off and where it favourably impressed fire risk authorities in initial testing.

Conclusion

Active fire safety systems are and will always be a 'reluctance purchase' for specifiers. Approving authorities will rightly regard innovative systems, i.e. ones that cannot comply with a product standard, with suspicion, too, preferring to err on the side of caution where life safety is at stake.

In spite of that, Plumis collaborated triumphantly with Exova Warringtonfire to overcome these barriers. With measured belief in their concept, enormous persistence, and, critically, the wisdom, knowledge and help of independent third-party testing, they have amassed an undeniable independent weight of evidence that it works. It proves that great ideas will win through. The Smartscan was launched in February 2016, and Exova Warringtonfire is now one of the most experienced water mist testers in the UK.

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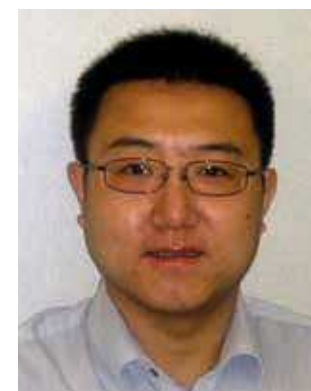


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Fire Safety – the weakest link

In today's world of innovative and increasingly challenging building design, it has never been more important to consider fire safety as an intrinsic part of the overall building design process. Life safety is paramount and cannot be compromised in any way. How can one ensure that fire safety provisions will all contribute positively to the overall objective in a consistent and compatible way with one another, as well as functioning as they should throughout their lifetime?



Jifeng Yuan

Traditionally regulators, designers, manufacturers and others rely on prescriptive measures and it is well known that in the UK, buildings must be designed and constructed so that “stability will be maintained for a reasonable period” in the event of a fire. There have been indications of moves within regulatory guidance from prescriptive rules to performance-based designs and risk assessment during occupation. This has resulted in greater responsibility for safety on construction companies and building owners or occupiers, including the installation and maintenance of passive fire protection (PFP) systems.

Therefore no matter which section of a building they may be working on, it is the duty of everyone involved in the specification or design to be aware of the overall fire safety strategy and to ensure that everything within their sphere of control complies with it.

It is vital that all protection measures are correctly designed, specified, installed and maintained so the building will behave as expected should an emergency occur. By their very nature fire safety provisions are ‘standing by’ until there is a fire and only then will their fire performance in a live situation be demonstrated.

Passive fire protection products

Passive fire protection is built into structures to provide stability and is vital to the performance of a building in the event of a fire. Such protection is either provided by the materials from which the building is constructed, or is added to the building to enhance its fire resistance.

As an example a component with a fire resisting function can resist fire in one or more of three ways. It must resist structural collapse and/or it must resist the passage of smoke and hot gasses (integrity) and/or

it must resist heat conduction (insulation). The starting point for fire safety evaluation will always focus on fire testing evidence from specialist independent laboratories in accordance with a range of relevant standards, such as BS, EN, or other national or international standards and codes. The scope of the performance will be further enhanced by assessments (and/or engineering judgements) undertaken by the laboratories or fire consultants.

Environment has a big part to play and these individual fire resistant elements might come into their own in harsh and hazardous offshore and on shore environments. Therefore the assessment of the entire structure must take into account stability when exposed to these environmental factors. It is particularly important that the individual fire safety products still function and fulfil their original fire protection tasks after lifetime environmental exposure within the context of the whole structure.

The best way to ensure products' quality is by third party certification which links the tested/assessed product with the actual factory production control and ensures traceability from raw material to finished product.

Installation, inspection, risk assessment and maintenance

However, the performance of a fire safety product is not only determined by the product performance in the testing and approval process, it is also largely determined by the quality of the installation process.

Investigations by Warrington Certification have indicated that the PFP in some buildings has been deviating from the highest quality. No matter how impressively the product has performed in testing and assessment, it is vital that

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Image courtesy of Exova

the installation strictly complies with the manufacturer's instructions and has been tested and approved. Whilst legislation does not generally cover installation of PFP products, installers have an obligation to install products completely and correctly to make sure that they will work as intended in the building.

The main contractor should identify competent contractors for the work concerned and, if a manufacturer's product has been specified, advice should be obtained on approved or recommended installers. Alternatively, certification bodies, such as Exova BM TRADA and Warrington Certification, carry searchable directories of third party certified contractors on their websites. Ongoing training of those responsible is important to understand existing regulations, ie the requirements of the Regulatory Reform Fire Safety Order (RRFSO); what the responsible person needs to consider within fire risk assessment; the legal obligations of the fire risk assessor; and how third party

certification can be a valuable resource and provide confidence in the process.

Given the installation complexities of most fire safety products, installation by competent contractors is essential, particularly in order to maintain the product's warranty. The best way to safeguard this is to use a third party certificated installer whose skills, training and competence will not only have been validated by an external organisation, but also backed up by random inspection of completed works. It is crucially important that the installation of passive fire protection, including the correct and timely scheduling of all the sub-contractor work, is factored into the main work programme.

The specialist contractor will not only fully appreciate and fulfil the design specification without compromise, but should also undertake their own quality assurance checks to ensure that the work meets the specification. Often this is complemented by checks or audits that manufacturers undertake to ensure that

their products are being installed correctly and/or by checks carried out by bodies certificating the installer.

Regular inspection is also important to identify deterioration or damage so that remedial work can be carried out promptly to maintain a continued level of protection. This requires a robust risk management system which covers: identification of the fire safety element; determination of the criticality of each element; assessment of each anomaly noted; risk assessment; and allocation of urgency rating for remedial works. Anomalies in the fire safety system identified by inspections should be repaired based on the risk assessment specific to the location and evaluation of the damage.

Conclusion

Legislation and guidance in many parts of the world impose increasingly strict requirements on specific products. The level of fire safety associated with construction is normally achieved as a result of various fire safety standards or codes. In general, prescriptive standards or codes serve the needs of regulators or approval authorities – in the vast majority of traditional constructions – well.

However these standards as they stand on paper do not explicitly address the concerns on safety of life or properties over the full lifetime of a structure. Over time a less conventional "engineering" approach has increasingly been adopted in modern designs, bringing a challenge to the more fundamental fire safety designs.

Life safety is not something that can be compromised. By their nature the fire safety provisions are 'standing by' all the time and disasters are waiting to happen if one weakest link fails in the entire chain.

In order to ensure that a fire safety system remains relevant to the needs of an industry and the buildings used within it, the characteristics of integral fire safety needs careful consideration. Central to good fire protection in engineering or safety specification is the use of genuine and appropriate product testing, assessment and certification. Robust testing within the overall production of industrial structures will ensure they remain fit for purpose, their fire safety elements are installed correctly and that over their lifetime they are managed and maintained well.

 For more information, go to www.exova.com/sectors/fire/

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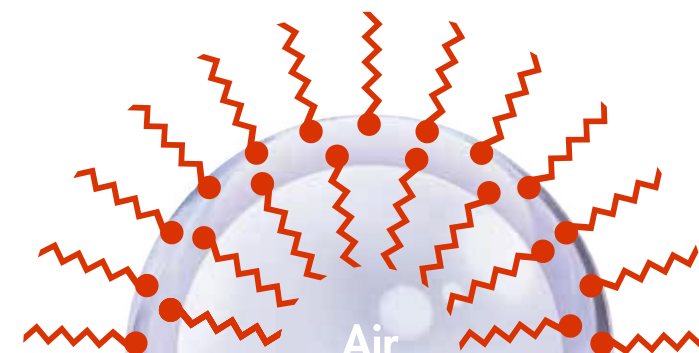
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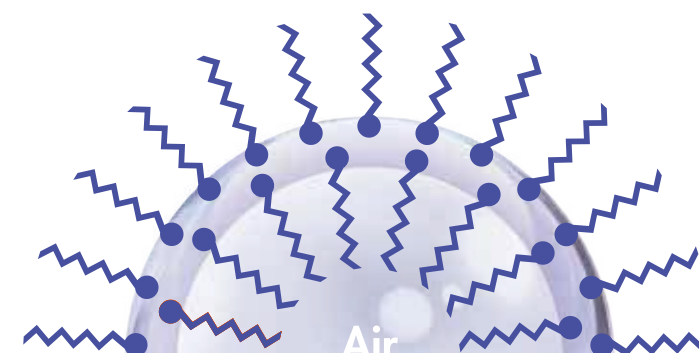
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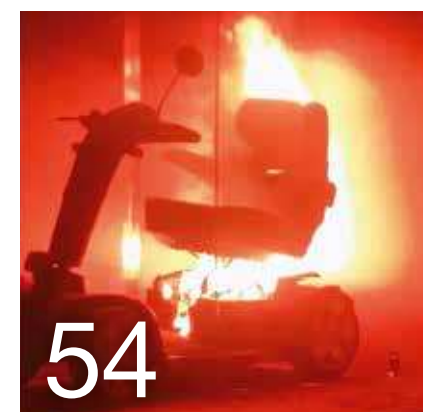
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Fire protection for the future

The fire protection industry is one that is slow to change, a pace driven by the need to meet regulatory requirements. One positive impact of the slow pace is the improved reliability of products which have been tested and retested to ensure they meet the necessary codes and will perform in field conditions. Unfortunately these tests can also elongate the time and high cost for the introduction of new products. Ultimately, this limits the ability to leverage new technology, limits the steps which can be taken to reduce product and installation costs, and limits the ability to improve communication with firefighters and end users.



Anthony Gryscavage
Tyco Fire Protection Products

areas such as in hotels, apartments, condo and assisted living facilities. With the development of wireless fire alarm systems, we are now seeing lower installation costs as one of the prospective key benefits. Particularly in existing structures, wireless fire alarm systems can provide a fully listed system while not having to pull wire behind walls or trenching between buildings. On both smaller and larger installations in hotels, museums, churches, universities, and multi-family housings, this can bring a significant cost reduction to the end user.

A second improvement we are starting to see in fire detection systems is the increased access to real time data and connectivity to other systems. James Pauley, President and CEO of NFPA recently stated “There is an emerging need for real time information on buildings (fire protection system performance data, fire fighting situational awareness data, community risk reduction data, etc.)”¹. By leveraging the power of the internet, and creating connectivity between building systems, we can gather tremendous amounts of useful data. For the fire protection space, that information can help with assessing system status, and enable tools that provide immediate notifications, initiation information, and recommended next steps. As I think toward the future, I can see how leveraging a large data set might then be used to develop probabilistic risk assessments around potential system failures. In turn, that information might also be leveraged to direct future development efforts of fire alarm and connected building systems. This type

of predictive analysis is commonplace in other industries; applying this type of analysis to fire protection is a next logical step.

With all new developments, we must also look at any potential negative consequences. For example, one of the concerns associated with a connected fire detection system is the overall security of the system and the potential for it to be hacked. Particularly in today's world, it is critical that the end user understands the risk associated with leveraging the internet for collection and delivery of any information. It is fair to assume that outside parties have an interest to attack systems, and for that reason, end users should rely on reputable companies who clearly understand the risks, and have taken steps to help provide protection against those risks. This will be an ongoing focus and an area of much study in the future.

Even though the fire protection industry is slow to change, we have seen some significant progress over time. The industry now has fully approved, wireless fire alarm systems which help drive down installation costs. We also are seeing implementation of connected systems which offer a tremendous opportunity for increased service efficiencies and long term improvement in design. With time and the integration of new technologies, I can see continued improvement of system performance, improvement in service efficiencies, and ultimately, an increased value to the end users.

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Brave New Hazards

As new technologies address the world's problems, they can also raise safety issues

Every day, as engineers and researchers address fire protection challenges, our world often unwittingly creates new hazards, a result of the technologies and alternative methods we develop to improve our quality of life. We have to address these hazards before, not after, a disaster occurs.



Casey Grant
Executive Director, Fire Protection
Research Foundation at NFPA

In April, the Fire Protection Research Foundation hosted the "Symposium on Fire Protection for a Changing World," one-day event in Munich, Germany, focused on emerging issues and the fire protection challenges that accompany them. The meeting let us take a hard look at issues where the lessons of history are lacking.

The program included multiple speakers and covered emerging applications, concepts, and methods, and the challenges and hazards they may create. Topics included the economic and environmental impact of fire, intelligent building design for the 21st century, mega structures, tall wood buildings, high-challenge warehouses, big-data applications for fire protection, and more.

While many new ideas have enormous potential for societal gain – and for addressing the accompanying fire protection challenges – the field of

electrical energy generation might be the clearest example. The world is hungry for electrical power for its consumer goods and other needs, and we want it with minimal adverse environmental impact. To address that demand, a number of new electrical energy generation and storage solutions have proliferated in recent years, including wind turbines, photovoltaic systems, and energy storage systems.

But emergency responders and fire protection professionals are now asking important questions about the safe design, installation, regulation, maintenance, and long-term operation of these technologies. Whether it's an internal defect resulting in thermal runaway, an external exposure fire, acts of arson or terrorism, mechanical impact, or electrical surge, we need to know how to handle compromised or damaged equipment under conditions of duress.

This effort has multiple players, including technology providers – it is not enough for them to deliver their innovations and walk away. Maximizing safety requires not just robust design, but also thoughtful installation and commissioning, balanced regulatory oversight, committed end-user maintenance, and responsible end-of-life handling, all supported by credible research. The Foundation has a clear role in this chain, exemplified by our multiple

research efforts addressing topics such as lithium-ion batteries.

Balancing the resources necessary to mitigate risk is not always easy. We don't have bottomless resources to create a perfectly safe world, so we must also determine the risk society is willing to tolerate, such as the severity of an event and likelihood of its occurrence. Decades ago, as a young fire protection engineer working in nuclear power plants, I visited the newly operational Zimmer Power Station in Ohio. Despite construction being 97 percent complete, regulators decided not to grant it a license to generate power because they couldn't confirm acceptable quality control of the construction process. Facility owners ultimately converted Zimmer to a coal-fired plant. The impact of change late in the game can be monumental, but it's sometimes necessary depending on the risk.

As technology evolves, society must continue to be vigilant for possible hazards, wise enough to understand the implications of failure, and courageous enough to be proactive stewards in the name of safety.

 For more information, go to
www.nfpa.org

Article courtesy of NFPA Journal
– Issue July/August 2016.

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06/2

Hard-to-access detectors – now easily tested!

Like many sites, the University of Southampton has some detectors which are installed in hard-to-access locations. When it comes to maintenance, the testing of these detectors is often a complicated process involving additional personnel, in the case of the University of Southampton this includes a lift engineer and facilities staff.

As well as adding additional cost to the routine testing – the need for additional personnel also takes a significant amount of



planning to arrange. The lift also has to be taken out of action, causing disruption and, in line with normal safety practice; each lift button over the five floors has to be covered promoting the lift being out of use.

To overcome the cost and disruption of testing such detectors, the fire system maintainer considered Scorpion. With Scorpion installed alongside the detector, testing could be carried out via an access point and controller – conveniently sited outside the lift shaft. The cost of installing Scorpion was considered against the current costs of testing – such as additional personnel, down time and the time spent organising. With Scorpion capable of 240 tests of 15 seconds – it was easy to justify installing Scorpion.

With everyone on site, the installation of Scorpion in the lift shaft was quick and simple. Future tests can now be easily achieved as part of the standard maintenance visit – without the need for additional personnel and planning time.



Images courtesy of Scorpion Tester

As well as smoke detectors, Scorpion also provides a solution for testing aspirating smoke detection systems. The University of Southampton have benefited from this as well by installing the system on an aspirating smoke detection system within a secure part of the building.

In addition to this install, Scorpion continues to bring benefit to sites across Europe ranging from hospitals and warehouses to airports and more universities. More information on these sites and the applications where they are installed is available on our website.

 For more information, go to www.scorpion-tester.com



Commenting on the launch of the new website, Maureen Donovan, Director of Marketing, Water and Mechanical product segment at Tyco Fire Protection Products said “We are delighted to launch our new AquaMist website, which contains thorough information about Tyco’s leading Water Mist solutions. It is a place where customers can effortlessly source the information that they’re looking for, with only a few clicks of a button.”

 For more information, go to www.tycoaquamist.com

Advanced’s Axis EN wins Polish Award

Advanced’s Axis EN fire panel has won the ‘Devices and Fire Alarms Systems’ category of the Polish POLALARM Awards. Organised by the Polish Association of Engineers and Technicians for Technical Security and Security Management, the awards are now in their 16th year and recognise both Polish and foreign products.

Commenting on the win, Krzysztof Dembinski from Advanced’s Polish partner Zeto-Project, said: “As Advanced’s partner in Poland we’re delighted that the experts at POLALARM recognise the features of the Axis EN fire panel. For us, it is reassuring to know that the fire safety systems from Advanced which we offer our customers are of the highest quality.”

The Axis EN is Advanced’s highest performance, EN54 approved panel range and is fully compliant with parts 2, 4 and 13. The result of decades of fire alarm and detection experience and research and development involving installers, specifiers, consultants and end users across the world, it is designed to offer more power and performance in a user-friendly enclosure. Then Axis EN packs more configuration, display, status and control options into its interface as standard than any other Advanced fire panel, which means less time and expense customising a system with peripherals.

About Advanced

Advanced is a world leader in the development and manufacture of intelligent fire systems. The legendary performance, quality and ease-of-use of its products sees them used in prestigious and challenging locations all over the world, from single panel installations to large multi-site networks. Advanced products include complete fire detection systems, multi-protocol fire panels, extinguishing control and fire paging systems.

 For more information, go to www.advancedco.com



Image courtesy of Advanced

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Tyco launch new website

Tyco Fire Protection Products, a division of Tyco, the world’s largest dedicated fire protection and security company, today announced the launch of its new AquaMist website, www.tycoaquamist.com.

The new website provides quick and intuitive access to information about its versatile and highly efficient AquaMist systems, as well as resources for customers with fire protection needs in data centres, industrial fryer protection, machinery space, cable tunnels, archives and commercial hazards environment.

The AquaMist product range from Tyco includes widely approved Water Mist solutions backed by over 100 years of expertise in fire protection. The new website provides key information about the application of AquaMist technologies in environments

where Water Mist can be engineered, tested and approved. The site also provides an overview of the AquaMist Water Mist products and various solutions across its Ultra Low Flow (ULF), SONIC and FOG systems. The enhanced website is intended to result in a more informative and user-friendly experience. It offers improved design and functionality, along with enhanced rich content that focuses on the various applications and fire protection requirements of the user. Application-led content helps visitors to quickly select among the fire protection solutions that can be best suited to their industry and specific needs.

Other new functions include: an approvals page, a video gallery and a news and events page which carries the latest updates and information.

Airport’s spray-painting hangar protected by FFE detectors

To protect workers during aircraft spray-painting, Cambridge International Airport have installed nine Talentum flame detectors and one Fireray beam detector from FFE.

“Because of the explosive nature of the paint used in the hangar, explosion-proof flame detectors were necessary,” commented Brian Myall, Fire Safety Officer for Marshall Aerospace and Defence Group, the company which manages the airport. “Our chosen installer specified Talentum UV/IR2 flame detectors and we are very impressed by their performance and reliability so far.”

In addition to the hazardous area of the hangar, a Fireray 5000 beam smoke detector is installed at ceiling level for general smoke detection.

Flame detectors are ideally suited to this type of installation as they detect almost all types of flickering flames. This is especially important in this application, where flames can originate from the paint and many other sources, including plastics, composites and even metals. By utilising infra-red (IR) sensing, they can also identify flames through dust, steam or smoke and are immune to the effects of wind or draughts.

The Talentum UV/IR2 also gives the highest immunity to false flame sources,

with internal self-test sources that check the detector’s operation when remotely instructed. The maximum ambient temperature is normally 55°C or 85°C for the higher temperature specification detectors.

For general smoke detection in large indoor spaces with high ceilings, like aircraft hangars, conventional point smoke detectors are not suitable as they can only be used at heights of up to 10.5 metres. Beam smoke detectors on the other hand can be used up to 40 metres. Wall-mounted, they transmit a beam of invisible infrared light across the building space to be protected and a receiver detects and measures the light and can recognise smoke interference anywhere along the beam path.

All types of aircraft, both civilian and military are painted at the site, which is capable of accommodating planes as large as a Boeing 747. The FFE units were installed by EFire of Norfolk.

Commenting on the installation, FFE’s Managing Director Mark Osborne said, “This is yet another example of the wide range of applications where our products can be used. We are delighted to have been selected to protect Cambridge International Airport in this way.”

For more information, go to www.ffeuk.com



New appointment at C-TEC

C-TEC has appointed Adam Mason as its new Distribution Account Manager covering the North and East of England and Scotland.

In this key role, Adam will drive sales growth by supporting electrical distribution companies at branch level and promoting C-TEC’s new improved NC951 accessible toilet kit, its ActiV fire detectors and its vast range of high-quality fire alarm control panels, call systems and hearing loops.

After leaving college, Adam completed a three-month tour of America as a football coach prior to securing a sales position at a major retail chain. Most recently, he worked in C-TEC’s busy manufacturing facility where he built up an extensive knowledge of the company’s innovative life-safety systems.

Charlotte Manley, C-TEC’s Sales Director said: “Adam is self-motivated, enthusiastic and determined to succeed in the distribution side of C-TEC’s business. His experience in sales and customer service will be an asset to C-TEC and I am delighted to welcome him to the team.”

Adam said: “I am very excited about



starting my new role and am looking forward to building on the already successful distribution partnerships in my territories.”

For more information, go to www.c-tec.com

Tridonic launches new LED Drivers with combined emergency lighting function

- Normal & emergency lighting modes for LED luminaires in one unit
- Practical and space-saving

Tridonic’s new EM powerLED 45 W LED Drivers in PRO DIM and SELV versions combine normal and emergency lighting modes for LED luminaires in one unit. The compact housings of the installation version save space in the luminaire and the modest space requirements of these combination devices will provide greater freedom for luminaire designers.

The combination LED Drivers provide an output of 45 W in normal operation, and the integrated battery system produces up to 4 W of emergency lighting power. In normal operation EM powerLED PRO DIM 45 W can be dimmed via DALI, switchDIM or the corridorFUNCTION and is prepared for ready2mains. Emergency light functionality is monitored centrally via DALI. One DALI address is sufficient for performing lighting control, dimming and the prescribed emergency lighting tests and for documenting this centrally – for example via connecDIM or the x/e touch panel. The devices are compatible with the EXCITE series of LED Drivers from Tridonic and can be easily integrated in any installation.

EM powerLED ST FX 45 W 50 V with SELV qualification is a version with fixed output and integrated self-test function. In normal operation this LED Driver provides the dimming function via the simple corridorFUNCTION and does not require a higher-ranking DALI system.

The weekly function tests prescribed for emergency lighting and the annual service life test are performed via the integrated automatic self-test function and a two-colour LED status display indicates the test results.

There are two housing versions available: a built-in version that saves on space in the luminaire and the Strain Relief (SR) version which supports a wide range of LED modules with external LED Drivers and which is immediately ready for operation together with plug-in remote batteries.



For more information, go to www.tridonic.com

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KEYNOTE SPEAKERS:

Vanessa L. Allen Sutherland - Chairperson & Member of U.S. Chemical Safety Board

Mu ShanJun - Vice President of SINOPEC Research Institute of Safety Engineering

Zhang Guangwen - Senior Engineer of SINOPEC Research Institute of Safety Engineering

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SPONSORS

Advanced protection for Natural History Museum

The world-famous Natural History Museum in London, and its more than five million annual visitors are being protected by intelligent fire panels from Advanced.

Often called the 'Cathedral of Nature' the Natural History Museum is renowned for its collections of dinosaurs and ornate architecture, and is widely recognised as the pre-eminent centre for natural history and related research. The Museum is the third most popular in the United Kingdom and its irreplaceable 80 million strong collection is of global importance and includes many collected by Charles Darwin.

Located in Kensington's Museum Quarter it was established in 1881. Its Grade 1-listed building comprises seven blocks, including the original Waterhouse Building, the Earth Galleries, the Palaeontology block and the twin Darwin Centres.

At the heart of the active fire protection for the Museum is a network of 24 MxPro 5, intelligent, multiprotocol panels from Advanced, plus remote control terminals, BMS interface and a bespoke PC based graphical user interface. The network was designed, configured and commissioned

by Pacific Security Systems, a long-time partner of Advanced.

Kirk Short, spokesperson for Pacific, said: "Advanced systems are well known for their performance, quality and ease of use. From our point of view, the MxPro 5 panel stands alone in the market for ease of installation and maintenance and for network stability and speed. We needed a system that is simple to operate, with the features the end user requires on a daily basis, while also offering backwards compatibility with some of the loop devices that are already installed at the site."

MxPro offers the market more choice and flexibility than any other system. It includes two panel ranges, the EN54 2,4 & 13 approved MxPro 5 and EN54-2&4 approved MxPro 4. It offers four protocols (Apollo, Argus, Hochiki and Nittan) and a completely open installer network, backed up by free training and technical support. MxPro 5 panels are backward compatible with existing MxPro 4 networks and include a host of features including TouchControl touchscreen remote control terminals with Active Maps and AlarmCalm false alarm management.

MxPro 5 panels can be used in



single loop, single panel format or easily configured into high speed, 200 panel networks covering huge areas. Advanced's legendary ease of installation and configuration and wide peripheral range make it customisable to almost any application and it is found in challenging and prestigious sites around the world including western Europe's tallest building, The Shard.

Rob Kemp, Advanced Sales Manager for the South of England, commented: "We are proud to have our British-made products installed in such a venerable institution. Advanced is renowned for making cutting edge products and this is the type of building where the quality, ease of use and flexibility offered by MxPro 5 panels offer tangible benefits."

For more information, go to www.advancedco.com

Fire Prevention Bodies back ABI sprinkler call

With just one month until the commemoration of the Great Fire of London, more than a dozen organisations have so far confirmed their support for proposals to ensure sprinklers are installed in more high-risk buildings, put forward by the Association of British Insurers (ABI).

Several major fire brigades as well as the Chief Fire Officers Association and a number of fire prevention bodies have all added their names to a call for action on sprinkler regulations to help prevent major and potentially deadly fires.

The ABI has issued the following call to Government:

"As the three hundred and fiftieth anniversary of the Great Fire of London approaches we urge the Government to modernise fire prevention rules by legislating for compulsory sprinklers in all new schools and care homes, and warehouses over 2,000m². Fires put lives at risk, cause disruption to our cities and transport networks and hurt the economy; failing to install sprinklers in schools and care homes is putting at risk the lives of the most vulnerable in our society."



Average insurance pay outs for commercial fires are now above £25,000 for the first time, a rise of 165% since 2004. The ABI estimates that repairing the damage caused by a fire the size of the Great Fire of London today would cost insurers at least £37 billion.

For more information, go to www.abi.org.uk

FFE showing the latest in detection technology at Security Essen

FFE is showing the latest in smoke and flame detection at Security Essen between September 27-30. The company will be showcasing its Fireray optical beam smoke detectors and its Talentum specialist flame detectors. FFE will be in Hall 3, Booth 3A62 – be sure to call past and speak to the company's industry experts.

Fireray beam detectors are specifically designed to provide protection in large buildings with high ceilings, where conventional point smoke detectors are ineffective. With their modern design and minimal footprint, Fireray detectors are used in applications as varied as airports, railways stations and warehouses to shopping centres, sports arenas and places of worship.

Talentum flame detectors are used in sensitive or dangerous environments to detect fires even before smoke is produced, or where smokeless fires may occur. By watching for and recognising the non-visible ultraviolet (UV) and infrared (IR) signatures of flames, the Talentum range does not need smoke to detect a fire. They can even detect flames through steam, smoke and, with an Air Purge Kit, dust. They are also immune to the effects of wind.

Commenting on FFE's appearance at Security Essen, the company's Managing Director Mark Osborne said: "Innovation is part of our DNA. Over 8% of all our revenues are re-invested back into R&D, developing the technologies that are at the core of

Fireray and Talentum and helping to bring about new technological breakthroughs. Through this ongoing research, FFE is not only providing quality today, but developing world-leading technologies for tomorrow. We look forward to demonstrating these technologies in Essen this September."

For more information, go to www.ffeuk.com



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FM approval for Firetrace International's E4

Firetrace International, the global manufacturer of fire suppression solutions for commercial, industrial, government and military applications, has achieved FM approval for its advanced E4 engineered clean agent total flooding system.

E4 obtained the FM Approval for its highperformance 500 PSI / 35 bar 3MTM Novec TM 1230 systems.

FM Approval is a testing standard issued by FM Global, a worldwide company that provides comprehensive global commercial and industrial property insurance. With the achievement of the FM Approval, FMinsured companies worldwide now have access to the industryleading performance offered by the Firetrace International E4 system.

E4, which is also UL Listed, delivers a host of substantial and measurable performance enhancements when compared with traditional clean agent total flooding systems. These include superior performance, greater flexibility, improved value, speedier installation and a measurable competitive edge for system installers.

"Our E4 system takes full advantage of the unique characteristics of 3MTM Novec™1230 Fire Suppression Fluid," said Mark Cavanaugh, president and CEO of Firetrace International. "It's a fantastic achievement to obtain FM Approval for E4 and reflects the hard work of our team in ensuring that our products meet the highest international standards."

Thanks to the unique properties of Novec 1230, E4 systems are safely pressurized to 500 psi (35 bar) in low-pressure hardware. The increased pressurization enables incredible performance gains when compared with traditional total flooding systems that conform to conventions developed for Halon in the 1980s; conventions that were continued by many HFC system manufacturers and ultimately on to their Novec systems.

The increased pressure of E4 offers greater design flexibility and lower overall hardware and installation costs. Its capabilities include a dramatic increase in both vertical and horizontal cylinder to nozzle distance when compared with



traditional clean agent total flooding systems. E4 systems use between 25% and 40% less piping and provide over 600% liquid agent to pipe volumes. This is the largest network possible without the need for expensive supplementary nitrogen driver systems.

Systems are available in eight cylinder sizes with fill volumes ranging from 8 lb. (4kg) to 1300 lb. (590 kg), with the 1300 lb. cylinder being the largest single unit fire suppression system in the industry. E4 is compatible with most popular releasing panels and complies fully with every aspect of NFPA 2001: 2012.

E4 clean agent total flooding systems are manufactured in an AS9100C/ISO 9001:2008 certified facility.

 For more information, go to www.firetrace.com

Faster, Safer, Simpler – Fire rated cable fixings

The British Standard requirements for fire resistant cable fixings are clear, the method of fixing MUST be appropriately fire rated. Cabling in escape routes MUST be fixed via fire resistant means.

Traditionally this would involve additional expense and time consuming methods of fixing cables. Gas fired solutions, P-clips with plastic plugs, retrofit trunking clips etc need no longer be the go to solution to achieve compliance.

Introducing the world's fastest, safest, simplest fire clip. The LINIAN Fire Clip.

With the LINIAN Fire Clip you can save time, money and lives. This single installation cable clip provides safe, simple,

rapid, robust and fireproof means of fixing cables to construction materials. The result of years of advanced technical research and direct experience, the LINIAN Fire Clip offers major advantages to the installer.

Equip yourself with an extraordinary upgrade in fire clip design that delivers major benefits in efficiency, safety and value for money.

Perfected through years of development, this exceptional innovation looks simple – and it is. Expertly designed to save time, money and lives, this remarkable evolution of a vital building component can help you make every job neater and more effective than ever.



With no plastic or perishable components and tested the most stringent of British and European fire standards, the LINIAN Fire Clip is without doubt the fastest, safest, simplest, compliant solution.

You'll wonder why no one has thought of it before, you'll be glad LINIAN has.

 For more information, go to www.linianclip.co.uk

C-TEC's new interactive website is here!

Cleverly-designed, easy-to-navigate and created with the user in mind, c-tec.com is packed with in-depth information on virtually every product in C-TEC's rapidly expanding portfolio of world-class UK manufactured life-safety systems.

Andy Green, C-TEC's Marketing Manager said, "The new website is fast, functional and optimised for enhanced user experience so visitors can find information quickly and easily. We hope customers will love the site's dedicated support hub which has been designed to provide them with 24/7 access to our comprehensive library of sales and technical literature, consultant specs, training session overviews, help videos, software, BIM and CAD drawings, approval certificates and more."

Fully responsive so it can be used on mobile phones as well as computers, the site also features up-to-the-minute company news, product releases, an exhibition diary and an interactive staff contact section.

Andrew Foster, C-TEC's Managing

Director said, "Investing in new web technology is key to our growth and continued international expansion. The new website is an exciting step forward for C-TEC and the perfect showcase for our soon-to-be-released range of CAST-protocol addressable fire alarm systems."

Currently celebrating its 35th Anniversary as a leading UK manufacturer of world-class life-safety systems including

fire alarm control panels, fire detectors, call systems, disabled refuge and hearing loops, C-TEC has recently expanded its magnificent 100,000 sq. ft. Challenge Way headquarters to include a new state-of-the-art manufacturing facility, training rooms, restaurant and staff canteen.

 For more information, go to www.c-tec.com



THE MOST EXPERIENCED MANUFACTURER OF SPECIAL HAZARD FIRE PROTECTION SOLUTIONS



Our team of specialists provides support to our global distribution network.



Providing the Most Efficient Package For Clean Agent Delivery Systems.

CLEAN AGENT FIRE EXTINGUISHING SYSTEMS • 3M™ NOVEC™ 1230 FIRE PROTECTION FLUID • FM-200®
LOW & HIGH PRESSURE CO₂ • ENGINEERED DRY CHEMICAL • FOAM • AIR SAMPLING • ALARM & DETECTION



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Honeywell Fire Safety

The sky's the limit for Morley-IAS and Project Airseeker

While it's the new aircraft that have grabbed the headlines, the associated ground support structure for Project Airseeker is equally important in terms of maximising the effectiveness of this investment. To that end, the Defence Infrastructure Organisation (DIO) made it a priority to provide new facilities at RAF Waddington, including a fully reconfigured maintenance and storage hangar, alongside a newly constructed annex to house administrative and training functions, as well as accommodation space.

The maintenance hangar is designed to service and maintain the aircraft and safety within this hi-tech environment is of paramount importance. In any environment with flammable materials, a fire detection and evacuation system is vital in order to keep people, property and assets safe. The DIO realised that only a state-of-the-art system could be relied upon to offer the requisite levels of protection and made contact with TecservUK to hear its recommendations.

Formed in 2001, Nottinghamshire based TecservUK is an established fire prevention company based in Nottingham. David

Leamon, the company's local Area Sales Manager, explains, 'Our reputation is built on having the highest levels of technical competency, professional working practices and ethical conduct. We work across a diverse range of sectors and have an excellent reputation for our quality of service, so when the DIO needed a fire detection system that could ensure complete safety for those working on Project Airseeker, we had the perfect solution.'

TecservUK was charged with specifying and configuring two separate fire detection systems – one for the hangar and another for the annex. Following a comprehensive site survey, products from Morley-IAS by Honeywell were chosen and asked to explain the rationale behind this decision, David Leamon replies, 'We have worked with Morley-IAS for many years and the quality of its products is second to none. Also, because of the robust way its systems are designed, we knew we could ensure maximum levels of safety and reliability.'

Both systems were based around the market leading Morley-IAS ZX2Se intelligent analogue addressable control panel. Dan Ascough, Business Manager for Morley-IAS comments, 'The ZX2Se has been designed and constructed around proven and reliable microprocessor technology. It supports a total of five industry leading

protocols, allowing fire detection devices to be independently selected based on performance or aesthetic appeal. Information on the location of fires, faults and system status can be easily displayed or printed in multiple locations, while integration with voice evacuation systems, paging systems and third party control systems is supported through a range of peripheral interface units. These features made it perfect for Project Airseeker.'

Equally suited for the hangar was a Honeywell FFAST LT aspirating smoke detection system. In order to cover an area over 15m high, the solution comprises of an enclosure, which houses the electronics that are powered from a supply, and a fan inside it that draws air in via sampling pipes that are connected to the unit. The air goes into an aspirating chamber and across a laser beam – if sufficient smoke particles are detected, an alarm condition will be activated. Servicing of the system is also easier because it can be conducted at ground level, as opposed to using overhead smoke detectors which would entail the use of ladders and poles.

As well as a wide range of call points, communication modules, isolators and enclosures, optical smoke detectors were used in both locations. By using the light scatter principle, they are ideal for applications where slow-burning or smouldering fires are possible and, when combined with ultraviolet/infrared flame detectors and a video smoke detection system, every possible eventuality has been covered.

The installation and commissioning process was incredibly smooth, which meant that the project was finished on schedule. TecservUK's David Leamon concludes, 'This was a fantastic project to work on and we are delighted to have been able to provide Project Airseeker with the industry's leading life safety solutions.'

 For more information, go to www.morley-ias.co.uk/



Image courtesy of Honeywell Fire Safety

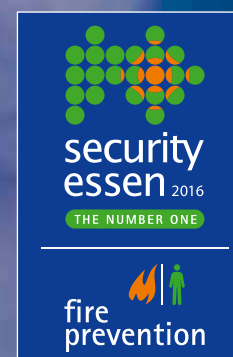
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www.security-essen.de



The Turbinator from Knowsley SK

Always providing precision proportioning

In-line water driven foam proportioning pumps have become more and more popular in the last decade. Their low pressure drop and accurate foam proportioning over a wide range of flows are necessary in many systems. But this technology is not simple: the equipment on the market until now is quite complicated and sensitive to contamination and over speeding. The new Turbinator water driven foam proportioning pump developed by Knowsley SK effectively solves these problems, making this technology the preferred choice for a wide range of fire fighting systems.

Precision proportioning – Always

The Turbinator is a positive displacement foam proportioning pump designed for Fixed and Mobile applications. The unit is driven by a special volumetric water motor which is directly coupled to a precision

gear foam pump. Because both parts of the Turbinator are positive displacement devices, the ratio of foam concentrate to firewater is fixed over the full operating range. This makes Turbinator the ideal proportioning technology for systems with different flows, such as multi-legged deluge systems, sprinkler systems and mobile large incident equipment.

The Turbinator unit does not require setting up or on-site adjustment – the proportioning rate is achieved at any flow rate and pressure within the operating range.

Technology built to last – Forever

With Turbinator technology, Knowsley introduced a flexible, abrasion resistant paddle material in the water motor which gives the unit its unique wear characteristics. The usual contamination present in fire water does not damage the paddles. Overspeed up to 120% of the nominal flow, which can occur during automatically controlled activation of large systems, does not damage the unit. In addition, the Turbinator resists dry running in accordance with NFPA20.



▲ MAXI Turbinator installed on fixed skid feeding foam pouring systems on storage tanks and bunds.

Design and installation: Simple as 1-2-3

The close-coupled design offers a very compact and efficient installation with just three connections: fire water inlet (1), foam concentrate inlet (2) and foam solution outlet (3). The unit can be installed directly into vertical or horizontal piping systems. The Turbinator foam pump delivers 3m suction height easily, which makes it possible to install the foam concentrate tank below the unit installation level – even with high viscosity concentrates in arctic conditions (thick foams). Simple, cost effective atmospheric foam tanks are fine for Turbinator.

With its unique low differential pressure, Turbinator fits in the most complicated systems, even when long pipe runs or static pressure loss are involved. Turbinator does not require external power supply or control circuits and is safe for any ATEX environment.

The Turbinator is available in 3 sizes from 500 l/min to 12'000 l/min with proportioning of 1% and 3% with freshwater and saltwater construction. Each Turbinator built in our Manchester, UK factory is 100% functionally tested on a high flow test rig through its whole operating range ensuring functionality at all times.

➔ For more information, go to www.knowsleysk.com



Positive displacement foam mixing machine



Integrated water drive and foam concentrate pump



Uses firewater supply as power source



Turbinator

Foam Mixing Technology



Fixed



Mobile



Truck

EFFECTIVE & FRIENDLY. IT'S NOT AN OXYMORON.



Solberg RE-HEALING™ Foam not only provides the performance you are accustomed to with current firefighting foams, and rely on, it's also safe for your firefighters and the environment. RE-HEALING Foam has superior vapor suppression and longer drain time for better burn-back resistance. The first true fluorosurfactant and fluoropolymer-free foam, there are no environmental concerns for persistence, bioaccumulation, or toxic breakdown.

Learn more about RE-HEALING Foam and 1%, 3%, 6%, 3x3% and 3x6% ATC™ concentrates available at solbergfoam.com

UL, ULC, FM, EN, IMO, ICAO

Product certifications vary dependent upon concentration type.



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What's new with... Foam concentrates

With the greatly increased emphasis on firefighter safety, the leading manufacturers have boosted their research and development efforts to provide the end user with the safest, most efficient and reliable foam concentrates. In this Buyer's Guide we highlight the latest offerings from the worlds leading suppliers.

3F Foams

For the past ten years the fire industry has been struggling to find the answer to the environmental issues surrounding foam concentrates. But now, following four years of research and

development 3F are clearly on their own when it comes to new generation products. 3F have now developed into Europe's leading manufacturer of technologically advanced foam concentrates. 'Solvent Free' technology was developed by 3F to reduce by 50% the COD and BOD of fire-fighting foam. This technology known as Smart Foam has been introduced to foams that contain fluoro surfactants and foams that are Fluoro Free, to provide a further environmental benefit for the end user.

In terms of both fire performance and lowest environmental profile, 3F are the first manufacturer in the world to introduce 'Fluoro Free and Solvent Free' foam to the industry. FREEDOL SF is the first FFF-AR of its kind using this technology and proving to the market that AFFF and AFFF-AR can be replaced when required. Another first is FREDEX SF1, the only 'Fluoro Free and Solvent Free' foam approved to EN3 for Class B and Class A with two of Europe's leading extinguisher manufacturers for use in stored pressure and cartridge extinguishers. This new Smart Foam product is now approved with a Chinese manufacturer to the Australian and New Zealand standards and will continue to expand into other world markets in the coming years.



For more information, go to
www.3fff.co.uk



ANSUL

ANSUL world-leading firefighting foam concentrates are backed by a 100-year legacy of proven quality and performance. Our products are developed and tested at the ANSUL Fire Technology Center, one of the most extensive fire research and testing facilities in the world.

ANSUL's full range of environmentally-mindful C6-based foam concentrate products includes Aqueous Film-Forming Foam (AFFF), Alcohol-Resistant Aqueous Film-Forming Foam (AR-AFFF), Class A, military-specification, high-expansion and fluoro-protein concentrates.

Our UL-listed and FM-approved foam concentrate products have been relied on to meet the most demanding challenges of industry and commerce, including high hazard/high risk markets such as aviation, chemical and petro-chemical, fire service and marine. All of our foam concentrate products are tested exhaustively with ANSUL industry-leading foam hardware products, ensuring optimal performance.

We do it all under one roof – R&D, design, engineering, manufacturing of agents and hardware, testing and training – so we truly stand behind the quality of our products. When it comes to helping protect your most valued assets, count on the ANSUL brand's century of leadership in the fire protection industry.



For more information, go to
www.ansul.com



Angus

Angus Fire has totally reformulated its range of firefighting foams under the Integrity banner to radically improve their environmental credentials in accordance with the US EPA's Stewardship Programme.

Every fluorinated foam within the range (from Angus FP70 to Angus Tridol Ultra 1-3) is now based on very pure C6 (short-chain) telomer chemistry. By working with regulators, customers and test facilities, each of these foam concentrates is now fully approved and suitable for use across a range of sectors on a wide variety of risks whilst maintaining the high performance that has become synonymous with any Angus Fire product.

In addition, Angus has released a range of fluorine free products for applications where environmental pressures are paramount. Angus Jetfoam is the first fluorine free, aviation foam to pass all aspects of ICAO Level B (fire and physical performance) and the only fluorine free foam capable of film formation on aviation kerosene.

The Respondol ATF is the brand new fluorine free foam from Angus Fire. A superior quality foam concentrate, designed for extinguishing and securing all types of flammable liquid fires and Class A incidents. Respondol ATF is a patented combination of surfactants and other ingredients specifically designed for general emergency responders who are faced with a variety of risks in a range of situations. Angus Respondol ATF is approved to EN1568 part 3 and 4 on all fuels and with all water types.

For more information, go to
fa@angusuk.co.uk



ANGUS FIRE

CHEMGUARD

CHEMGUARD firefighting foam agents are engineered to meet the challenges of special hazards within the industrial, marine, mining, municipal, oil, petrochemical and transportation industries.

Our full range of environmentally-mindful C6-based foam agent products including Aqueous Film-Forming Foam (AFFF), Alcohol-Resistant Aqueous Film-Forming Foam (AR-AFFF), Class A, military-specification, high-expansion and fluorochemical agents are suitable for a variety of industry applications.

Our world-leading foam agents undergo extensive testing



Dafo Fomtec AB

Dafo Fomtec AB is a producer and supplier of firefighting foams, powders and equipment. We are an independent and privately owned company with head office in Stockholm and production in Helsingborg in Sweden.

We are dedicated to high quality and high performing firefighting products to fulfill your demands. Many of our products have international recognized approvals such as: UL, FM, EN 1568, ICAO, IMO, MED and so on. During the years, we have put a lot of resources and effort in research and development to continuously improve our product portfolio – both regarding performance and environmental profile. As a part of this work, we perform annually over 300 full size fire tests where new products are put to the limit before they are sent for approval and placed on the market.

Our product portfolio consists of a wide range of products of all kinds and for all markets. The film forming AFFF- and AFFF-AR foams have been successfully transferred to the short chain C6-fluorosurfactants. Their performances have been evaluated in full scale fire tests before released to the market. In the range you also find protein-based foams, such as P-, FP-, FFFP and FFFP-AR types. We also offer a wide range of fluorine free foams – marketed with the name Enviro. Here you find Class A foams, multipurpose foams and FFF-types. The latter being fluorine free foams with high fire performance to be an alternative for AFFF- and AFFF-AR types. We also offer different types of foam solutions (premixes) as well as training foams – the latter especially designed to have as small environmental impact as possible.

For more information, go to
www.fomtec.com

For more information, go to
www.chemguard.com

CHEMGUARD

with best-in-class CHEMGUARD foam hardware products, making for the ultimate combined solution of UL-listed and FM-approved products. Known for advanced research and development, engineering and design expertise, quality manufacturing and high-end, field-tested products, we provide unmatched customer service and field support. Trust the CHEMGUARD brand for your foam product needs.

PROFOAM

PROFOAM is specialised in production of firefighting foams. Years of innovative research have resulted in the development of more than twenty unique products, protein and synthetic based, adapted to a wide range of international firefighting requirements.

The production plant is located at Novara (near Milan Italy) in the heart of Europe, allowing an easy access to most countries around the world. What sets us apart is having a substantial production facility (200m3 with adequate supplies of foam concentrate).

Large production capacity, quality products, knowhow and reliability distinguish PROFOAM as the universal leader of foam manufacturers, giving the professional end user the quality assurance they need where matters of safety are paramount.

For the oil industry we recommend the use of protein based foam compounds (FP, FFFP, ARFP), as they provide superior burnback resistance, as well as being kinder to the environment. Besides in places where sea water is used for firefighting, protein foam compounds work more effectively with sea water than synthetic foams.

Dynax

Founded in 1991, Dynax is a leading producer of fluorotelomer-based surfactants and foam stabilizers used in fire-fighting foam applications. As a result of the SBIR project carried out for the Air Force, Dynax developed environmentally more benign AFFFs and proposed higher performance standards for Mil-spec agents. Dynax also developed the first polymeric foam stabilizer (C6≥99%), making it possible for customers to produce low-viscosity or Newtonian AR-AFFF.

Dynax fluorochemicals, all derived from a high-purity short-chain (≤C6) fluorotelomer intermediate, neither contain PFOS and nor degrade into PFOS or PFOA.

With more than 90 years of combined experience in the fire-fighting foam industry, Dynax's expertise includes the development of new and innovative fluorochemicals and technical support to foam agent producers.

Today, as one of the largest producer and supplier of specialty fluorochemicals to the fire-fighting foam industry, Dynax continues to develop benchmark products to further strengthen its growing leadership.

For more information, go to
www.dynaxcorp.com

dynax

FLUOROchemicals



Major international petrochemical companies and oil industry have trusted us with using our products in their depots, refineries and chemical process.

PROFOAM is also known for its concerted effort to utilise chemical products that have least environmental impact, as well as for its short delivery terms, expertise and availability in customers' assistance.

Responsible for worldwide sales, the PROFOAM INTERNATIONAL team in Paris assists and advises international end users in the correct choice of foam compounds.

For more information, go to
www.profoam.it

FOAM FIGHTS FIRE

We offer a full range of Internationally Approved, High Performance, Environmentally Compatible Fire Fighting Foams.

NEW All **STHAMEX® AFFF** and **MOUSSOL® APS AR-AFFF**, have been re-formulated with latest Generation C6 based Fluorosurfactants.

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AUXQUIMIA

All the products manufactured by AUXQUIMIA are developed by its own R&D&I Department. Being aware of the importance of this research, AUXQUIMIA makes a remarkable effort, both technical and financial, in order to be in a constant evolution to achieve the best performances.

We are producing top-performance foam without the use of C8 chemistry to the point that, in 2015, our US branch even qualified our C6 formulation for a 3% AFFF that met US military specification MIL-F-24385, which is currently listed in the QPL Directory as Phos-Chek 3% AFFF MS. This was the first C6 fluorochemical foam concentrate to be listed in the QPL in accordance with the US Environmental Protection Agency's Stewardship Programme – no small achievement considering this certification is the most demanding in the world for AFFF's.

Our range of fluorine-free foams UNIPOL-FF has been evolving through the years to cover most industrial and civil applications. In 2011 it achieved a rating of 1B in Heptane and 1A in acetone on EN-1568:2008, in 2012 it achieved LASTIFIRE certification and in 2015 UNIPOL achieved UL 162 listing (Standard for foam equipment and liquid concentrates) with polar solvents, an extraordinary achievement given that all other fluorine-free foams have only been listed with hydrocarbon fuels.

Furthermore, sprinkler tests based on the same protocol with UNIPOL-FF-3/6 were also carried out with the challenging polar solvents acetone, ethanol and isopropyl alcohol, and the results again showed very good extinguishing times. Our foams are under constant development and we have set ourselves some further challenges for the future.

For more information, go to
www.auxquimia.com



AUXQUIMIA
Fire fighting products

Fire Safety Devices

FireChem is committed to serve you better by providing the best possible Fire Chemical Solutions to meet the modern challenges of Fire & Safety requirements involving Flammable Liquids Hazards & Gaseous Hazards inherent to Oil & Gas, Aviation, Industrial & Civil Sectors.

FireChem was established in 1999 as part of Fire Safety Devices Group and has grown to become the largest Fire Extinguishing Chemicals manufacturer in the Asia. FireChem has a reputed place among the top manufacturers in the Global Fire Fighting Chemicals Industry.

FireChem's reputation for Quality and Reliability is widely acclaimed and its products meet various National and International Standards. The product quality is further endorsed

Solberg

Solberg is your one-stop resource for high performance, sustainable firefighting foam concentrates and custom-designed foam suppression systems hardware. Solberg has the expertise, capabilities and resources to serve the high-hazard, high-risk market sector globally.

RE-HEALING™ Foam concentrates from SOLBERG are an innovative, high fire performing environmentally sustainable fluorosurfactant and fluoropolymer-free firefighting foam used to effectively extinguish Class B fuels with no environmental concerns for persistence, bioaccumulation or toxic breakdown. RE-HEALING foam concentrates are very effective firefighting foams for flame knockdown, fire control, extinguishment, and burn-back resistance. Control, extinguishing time, and burn-back resistance is paramount to the safety of firefighters everywhere.

RE-HEALING foam concentrates have shown excellent performance in each of these categories. Concentrates are available in 1%, 3%, 6% 3x3% ATC and 3x6% ATC formulations.

ARCTIC™ AFFF, C6 compliant foam concentrates are intended for use on Class B hydrocarbon fuel fires and are available in 1%, 3% and 6% concentrations. ARCTIC ATC™ foam concentrates are intended for use on Class B hydrocarbon and polar solvent fuel fires. Concentrates are available in 1X3%, 3x3%, and 3x6% ATC formulations.

FIRE-BRAKE™ foam concentrate is a synthetic firefighting foam concentrate specially designed to be used for wildland, structural and other Class A fuel fires. The foam concentrate is biodegradable and non-toxic, so it is environmentally sustainable. FIRE-BRAKE foam concentrate is proportioned at a rate of 0.1% – 1.0%.

SOLBERG brand foam suppression systems hardware is engineered by a team with over 225 years of combined in-the-field fire protection experience. As a custom manufacturer, we tailor firefighting hardware to meet your particular specifications. You can count on us to work with you and deliver products that perform as needed, when you need them.

For more information, go to
www.solbergfoam.com



by certification agencies like – Underwriters Laboratories (UL), Germanischer Lloyd (GL), Det Norske Veritas (DNV), Lloyd's Register (LR), Bureau Of India Standards (BIS) etc. FireChem is certified to ISO 9001 Quality management system and ISO 14000 for Environmental Management System.

FireChem is in a position to offer any type of Foam Fire Extinguishing Concentrate which can comply International Standards like UL 162, US Mil Spec, ICAO Level A & B, UK Defence, EN 1568, GL, IRS etc.

For more information, go to
www.fcfsd.com



BIOex

Since 1998, BIOex has designed and manufactured the latest generation of ecological foam concentrates and also produces conventional foams for use in firefighting operations – solid class A fires, liquid class B hydrocarbon fires, liquid class B polar solvent fires and toxic gaseous vapors.

- 2002 – At BIOex we were convinced of the harmfulness of fluorine derivatives and were already working to preserve our environment by launching ECOPOL, the first fluorine-free multi-purpose foam concentrate.
- End of 2015 – We launched the new formula ECOPOL F3 HC specially developed to create the first fluorine-free 3% foam concentrate with an exceptionally fast extinguishing action on hydrocarbon fires.

Specializing in the design and production of ecologically friendly 100% fluorine free foam concentrates; BIOex has launched a new formula – ECOPOL F3 HC. THE first fluorine-free 3% foam concentrate for hydrocarbon fires that performs better than the best AFFFs.

Ecological

- Fluorine-free 3% foam concentrate
- Readily biodegradable

Exceptional Extinguishing Performance

- Used at 3% in direct application on hydrocarbon fires
- Obtained the best 1A performance classification under EN 1568-3 standard by an independent recognized laboratory (certified 1A/fresh water – 1A/sea water)
- Obtained the best performance classification under LASTIFIRE – Good-Good-Good

Effective On Hydrocarbon Fires

- Exceptionally fast extinguishing action on hydrocarbon fires
- Very long burn back time equal to the best protein foams!

Powerful Foaming Capability:

- Offers durable adherence on vertical surfaces
- Insulates of storage containers in case of fire nearby

See the video ECOPOL F3 HC versus AFFF at
<https://www.youtube.com/watch?v=oVZOWMHsnYs>

For more information, go to
www.bio-ex.com

BIOex Foam concentrates



NEW

ECOPOL F3 HC

Ecological foam concentrate for Hydrocarbon fires

- ▶ More effective than the best AFFFs
- ▶ Equal resistance to protein foams
- ▶ EN1568-3 certified:
1A at 3%
- ▶ LASTIFIRE certified:
Good-Good-Good
- ▶ Fluorine-free



www.bio-ex.com

Dr Sthamer – Hamburg

As Europe's foremost Fire Fighting Foam Manufacturer, Dr Sthamer – Hamburg has been developing and producing foams since the 1920's. Dr Sthamer is a Hamburg based independent family owned business founded in 1886.

Dr Sthamer have been formulating firefighting protein and fluoro-protein based foams as well as AFFF, AR-AFFF and Fluorine Free Foams.

Their latest generation foams are divided into 3 product families:

- Fluorinated AFFF and AR-AFFF using the latest C6 Carbon chain fluorosurfactants in full compliance with the US EPA 2015 requirements and the EU 757/2010 POP (Persistent Organic Pollutants) Directives. These foams are independently tested and certified by 3rd party laboratories to EN1568, UL, IMO, MED, ICAO LASTFire Etc.
- Fluorine Free Foams, AR-Fluorine Free Foams, Class A 0.5% and 1% Foams, CAF's Foams, High Expansion Foams and Wetting agents all with 3rd Party Independent certification.
- Protein based foams, including FluoroProtein foams with UL Listing, EN1568 and IMO1312 approvals.

Dr Sthamer Foams, are suppliers to the Petrochemical Oil and Gas Industries, Aviation, Marine and Offshore and to Municipal and Military market customers Worldwide.

We operate a 24/7 Emergency Supply capability, and can mobilise supplies at any time of day or night for worldwide shipments, by truck and air.

For more information, go to
www.sthamer.com



Orchidee

Orchidee is a leading European developer and producer of a wide range of firefighting products. Orchidee Foams, Powders, and Water Additives are marketed worldwide and its Orchidex and Pulvex brand names are a symbol of quality and Performance.

Orchidee is the preferred supplier to a wide range of customers across many industries, and across the globe. These include, the world's leading manufacturers of portable extinguishers, fire brigades, large industrial companies, oil refineries, electricity plants, storage farms, airports, oil & gas exploration, military and others.

The company's in-house R&D division is continually advancing the industry with cutting edge products that are breaking new ground in terms of performance and biodegradability. In 2010, Orchidee introduced BlueFoam to the market, a top performance fluorine-free foam, which is setting new standards of environmental & safety.



Williams Fire & Hazard Control

The Williams Fire & Hazard Control business boasts a successful history of responding to over 200 industrial fire incidents throughout the world. Such success inspired a full line of specialized response equipment including high performance nozzles, high-flow transportable firewater pumps and monitors, foam concentrates, mobile response trailers, foam proportioning systems for field use and fire trucks, dry chemical extinguishing packages and advanced storage tank protection. From storage tanks and pipeline emergencies to offshore platforms and vessels at sea, response personnel and specialized equipment stand ready to respond to the industry's worst fire emergencies.

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Committee for Socio-economic Analysis (SEAC), Draft Opinion, on an Annex XV dossier proposing restriction on PFOA, its salts and PFOA-related substances, 10 September 2015, p14.

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Why evacuation planning must be prioritised

Evacuation planning is a central tenet of safety strategy for commercial buildings and any owner or manager who underestimates this responsibility is placing people, assets and everyday operations at greater risk. The safety of people should always be the top priority of such strategies but the financial, commercial and legal implications of failing to properly prepare are worthy of consideration.



John Robb

In 2012, the cost of commercial fire damage in the UK was circa £620m, according to the Association of British Insurers. There is also strong evidence from the US that over a third of businesses never resume operations after a major fire – losing orders, contracts, and key employees, which results in lost jobs and services to the community.

Neglecting the safety of the people in the building that an owner or manager is responsible for can lead to reputational damage. Reputation is an intangible and priceless asset that when damaged, can have a negative impact on an organisation's shareholders, profitability, market share and even its bottom line.

▼ The installation of call points is essential in many large commercial buildings.



John Robb is commercial buildings segment manager, Eaton EMEA.

The growing and increasingly diverse risks faced by those responsible for commercial buildings make it more important than ever to have a robust evacuation strategy in place. It is both a legal and a moral obligation for the managers and owners of buildings to uphold, which not only means having the right systems in place, but also ensuring they are properly maintained so that, if the worst happens, they switch into action.

The completion and ongoing review of risk assessments is crucial in identifying and dealing with risk factors. The specific risks identified from undertaking a detailed fire risk assessment will vary from building to building, as every building has a different construction, layout and processes. For instance, the risks in an office building will somewhat vary to those in a hotel or a sports arena. The risk analysis must also consider what type of occupants

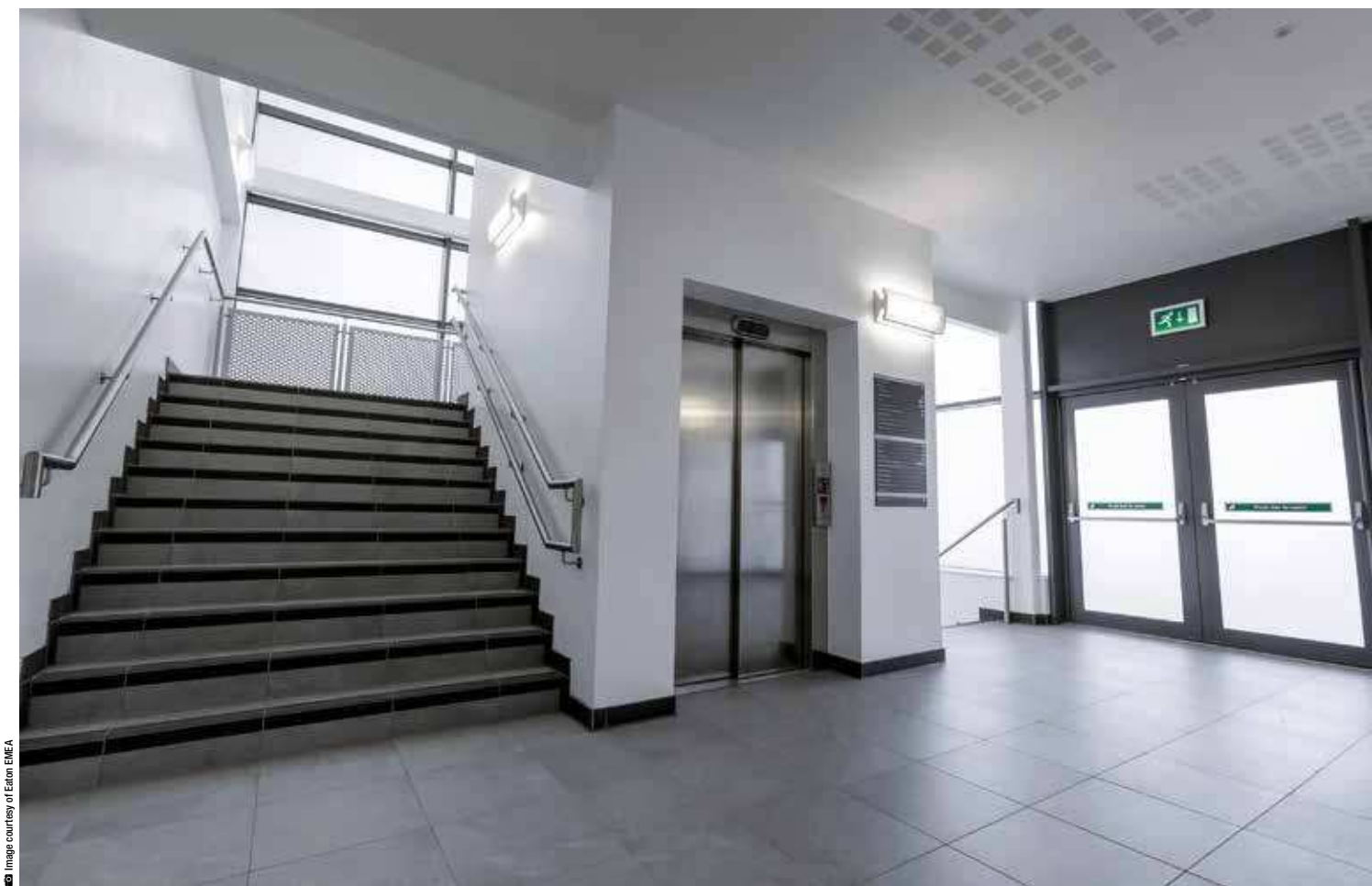


Image courtesy of Eaton EMEA

are likely to be present in the building – are they employees that come in every day, or guests visiting for one day only? Are certain occupants particularly vulnerable? Considering the proportion of people who have a limiting long-term illness, impairment or disability, this should always be included in the risk assessment.

Specific risk scenarios to consider include buildings that are open to the general public. When a building is filled with the same occupants on a regular basis, it is likely those occupants will be part of the fire alarms weekly test and possibly an evacuation drill. However, in buildings where there is a large proportion of people who are not familiar with their surroundings, such as a sports arena, hotel, shopping centre or transport hub, an evacuation may be delayed or even ignored due to inaction by those visiting occupants. These are particularly important considerations in an increasingly urbanised world where high-rise buildings, large leisure facilities and multi-purpose buildings are becoming more common.

Bells and sirens can be mistaken as general background noise that don't grab occupants' attention or compel them

to act. Voice Alarm (VA) systems are the quickest way to evacuate the public and staff from a building. In the UK, VA systems are recommended for all public buildings and multi-storey buildings over four floors. Following fire detection, automated messages control the flow of people in stairways and corridors allowing an orderly evacuation without panic. These messages can be supplemented by spoken messages from the fire service or management suite confirming the need to leave the building.

The potential presence of people with disabilities or limited mobility should also be borne in mind. It's important to note that not all people with disabilities need assisted evacuation. On the other hand, not all disabilities are visible, and people with 'hidden impairments' such as visual or hearing impairments may also need assistance. This group is particularly vulnerable if they are alone at the time of an evacuation.

People with physical disabilities will need to reach emergency exits as quickly as possible and this might necessitate specific forms of assistance. Staircases present difficulties to those with physical disabilities. If lifts are automatically deactivated when

▲ Exit routes are a vital consideration and lifts may be deactivated in an emergency.

an emergency alarm is sounded – as is the case in many modern buildings – contingencies need to be considered.

In buildings with many floors it might be necessary to create designated refuge areas with two-way communication systems, whereby trapped occupants on an upper floor can notify fire and rescue personnel on the ground floor of their whereabouts.

Exit routes should be made apparent by illuminated signage and emergency lighting, which are designed to help occupants of commercial and industrial buildings find their way out in the event of power being cut. Contingencies must also be made for people with impaired eyesight, particularly if there's a possibility of them being unaccompanied in a building at the time when an evacuation procedure is activated.

For building occupants with hearing impairments, the most common solutions are flashing beacons known as VADs (Visual Alarm Devices) or tactile devices such as pagers and vibrating pillows or



▲ Busy public buildings such as shopping centres present particular evacuation challenges.

beds. Each of these technologies has its advantages and weaknesses, which must be evaluated against the perceived risk. In Europe, the requirements for VADs are set out in the EN54-23 standard introduced in 2014.

One of the key considerations around emergency lighting is that increased illumination is required in areas that are designated as high-risk task areas, where staff or third parties are exposed to specific hazards. These enable safer movement of people in the event of a blackout. Typical high-risk task areas include kitchens, first aid rooms, treatment rooms, refuges, plant rooms, switch rooms, winding facilities for lifts, fire safety equipment and reception areas.

Industrial buildings present additional risks as they contain machinery and other equipment that not only block occupants' escape routes, but increase the speed that a fire spreads. To mitigate these risks, an appropriate risk assessment compensating for the potential hazards is extremely important. In the event of a power failure, some machines may continue to function and be a danger to employees when exiting the building. In this instance, a product with a much

higher level of emergency lighting than the standard solution can help.

The common requirements for all fire detection, notification and emergency lighting systems are that they should be compliant with regulations; applicable to the specific risks identified; easy to operate, test and maintain; and reliable.

Designing and installing life safety systems for a building must always be done through a partnership with one or more appointed competent people. If you do not have this competence yourself, you must therefore appoint fully qualified engineers who will use their expertise to meet the specific requirements of your project.

Maintaining life safety in the event of an emergency isn't just about having the right systems in place, but ensuring they are properly maintained so that, if the worst happens, they can be relied upon.

In the case of a fire hazard, fire systems combine detection and notification in a single control panel that, being 'addressable', indicate the location where the hazard was detected. This helps the appointed occupants to guide others in the right direction towards safety, as well as reduce the time taken by fire services to locate and tackle the potential fire. These systems are highly effective but they are not 'fit and forget' solutions. They require regular testing and maintenance, which should be properly recorded and logged.

The latest monitoring systems for emergency lighting should also be considered. These are intended to eradicate the associated costs and time constraints associated with manual maintenance checks.

While fire remains the most widely-perceived risk to commercial buildings, risks are becoming more diverse, with the threat of terrorism, crime and civil unrest all looming large.

As a result, both technology solutions and regulatory requirements are likely to evolve considerably in the years to come.

For example, the current UK version of the code of practice for emergency lighting is being reviewed. Included in this review is the safety of the occupants that are not evacuated in a lighting supply failure, such as care homes and hotels. These are now classified as 'stay put' occupants and in some cases they will need defended locations.

In terms of technology, mass notification systems could soon become more widespread in parts of Europe where there are increasingly large public sites such as sports arenas and university campuses.

As part of a wider move towards integrated smart city networks that monitor and optimise energy supply and demand across a city, buildings will use sensors and control systems to adapt to changing weather conditions and occupancy levels in real-time. The connected city and the power of data should mean better information for threat analysis and response. The devices we all increasingly carry around, such as smartphones and wearables, link us in to this information flow and can offer guidance to direct us away from the hazard threatening the safety in a building.

Another emerging trend is dynamic sign technology and routing control. In the event of an incident, this system will be able to indicate the best evacuation route, as well as block access to dangerous zones.

In a world that is constantly changing and evolving, the key to safeguarding occupants is proactivity. From updating the right evacuation product to suit the profile of a building, to ensuring proper maintenance of that bespoke product, it's vital that building owners act rather than react.



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Working together for fire safety

The Association for Specialist Fire Protection assembled together key experts from across the entire construction process to answer audience questions and concerns about fire protection. ASFP CEO Wilf Butcher chaired the session.

The interactive question time event, held on 22 June during Firex International, allowed visitors to pose questions to a panel of specialists; each representing a different industry discipline. Panellists ranged from an architect through to the building owner including; a criminal regulatory lawyer, a fire engineer, a Tier 1 contractor and specialist subcontractor, as well as passive fire protection manufacturers, an insurer, and representatives from building control, the fire service and a test house/certification body.

The wide ranging discussions that ensued highlighted a number of key issues affecting the fire safety industry, including: fragmentation within the construction design and build process; the need to ensure adequate understanding and training for specifiers; improving standards of fire protection installation; ensuring competency in fire risk assessment; and improving building resilience.

Fragmentation within the construction industry

A common theme throughout the question time session related to fragmentation within the construction industry, which was seen as a barrier to the correct specification and installation of all fire protection materials and systems. A number of the gathered experts highlighted a need for better interaction between all construction industry disciplines with a call for earlier engagement of fire safety professionals in the construction process.

Disjointed management was also highlighted as an issue which can lead to a lack of communication, particularly in big organisations, from on the ground, operative staff and subcontractors all the way up the chain to Board level. In fact, this was cited as one of the reasons why prosecutions are on the increase.

▼ ASFP CEO Wilf Butcher chaired the event.

One example given was that a lack of communication can enable contractors that know nothing about fire protection being required to install such systems, leading to a complete lack in confidence in the work being delivered. It was also recognised that fire protection is often installed by every trade in the building process and not just fire protection specialists.

Poor specification

It was considered that there is a responsibility on contractors to include fire protection as part of their phasing process but it was acknowledged that this often happens too late. This led to a call for greater collaborative working and earlier involvement of fire professionals in the design and build process. A move that was also seen as advantageous, due to a perceived lack of training for specifiers leading to a poor understanding of fire protection issues.

There was general consensus from across the spectrum that specification was often decided on price alone, something for which the whole industry had to take some responsibility. However, it was suggested that from a legal standpoint, any decision that is made purely on price is known as an aggravating procedure for court proceedings. It was noted that if there is a safety issue that can be dealt with by using a more expensive product, then a business owner must conduct a cost benefit analysis to assess how much they are willing to spend to deal with the amount of risk to not only life safety but also building safety.

Once that cost benefit analysis has been conducted then the decision can be justified. If such an analysis is not carried out and the decision is made purely on a cost basis then that will be

considered an aggravating feature so there is a culpability issue. The case was argued that specification decisions should be made by a multi-disciplinary team, which should produce a so-far-as-is-reasonably-practicable solution, taking into account all the factors, not only cost.

Inconvenience was highlighted as another factor which may prevent the installation of appropriate products. If a product is seen to be difficult or time-consuming to install, it may be left out because it is inconvenient and prevents the building being closed out. Again, from a legal perspective, this would be considered an aggravating feature.

It was proposed that wherever possible specifying products that can be installed quickly and easily would improve the likelihood of their installation. However, there was recognition that generally the products being installed are not complicated, but that the buildings into which systems are being installed are becoming increasingly complex.

It was argued that it is the non-engagement of the fire proofing contractor during the design and the early construction process that makes fire protection difficult to fit, rather than any complexity within the fire stopping systems themselves.

An example was used to highlight that inappropriate scheduling of work can be a significant problem for specialist contractors. Where a building's fit out process has allowed for free reign in the installation of the ductwork, dampers, electrics and the air conditioning, together with everything else fitted into the building; then the specialist fire protection installer has to try to fit the relatively simple fire stopping systems around them.

Working with the designer/contractor at the beginning of the building phase of a contract will ensure that all the services are installed in such a way that products can be used correctly by the specialist contractor.

Such engagement at an earlier stage of the construction process would also be welcomed by other sectors of the industry, for example, insurers. Involvement of an insurer in the design phase of a building can assist with the business impact analysis and contribute to the specification of passive and active protection that would improve the business resilience of the occupant of that building.



Image courtesy of ASFP

▲ The expert panel faced questions from the audience.

Fire risk assessment

The Regulatory Reform Fire Safety Order was also discussed, with panellists ask to consider, some 10 years after its introduction, whether it was fit for purpose. Many expressed the view that it had resulted in improved levels of fire safety.

It was noted that the number of fires in commercial buildings has decreased and the lack of a suitable and sufficient fire risk assessment was cited as the main reason for prosecutions. Meanwhile, contractors reported that building inspections undertaken as part of fire risk assessments was resulting in work being undertaken to repair legacy issues where fire protection has been breached or incorrectly installed in the past.

Nevertheless, there was general concern about the competency of fire risk assessors, with fire risk assessments described as wholesalely unfit for purpose. With no minimum level of competency required for a fire risk assessor, and no established minimum qualifications, there were calls for a minimum level of competency to be mandated.

The transfer of information about fire safety systems to the responsible person once a building is commissioned was also highlighted as a major issue. Despite this being a legal requirement under

Expert panel

- **Architect/designer:** Paul Bussey, AHMM architectural practice
- **Criminal regulatory lawyer:** Kizzy Augustin, Pinsent Masons LLP
- **Fire engineer:** Glenn Horton, H+H Fire
- **Main contractor:** Gerald Laxton, Kier
- **Passive fire protection installer:** Gareth Dean, Sharpfibre
- **Passive fire protection manufacturer:** Carl Atkinson, FSi (Chairman ASFP)
- **Passive fire protection body:** Dr Eric Southern, Intumescent Fire Seals Association
- **Fire Service:** Mick Osborne, DCFO Buckinghamshire Fire & Rescue and Chief Fire Officers Association lead on fire protection
- **Certification body/Testing laboratory:** Ross Newman, Exova BM Trada
- **Building control:** Martin Taylor, LABC
- **Insurer:** Allister Smith, Aviva
- **Building owner:** Bob Bantock, National Trust



Regulation 38 of the Building Regulations, there was widespread belief that this information was rarely passed on to assist with fire risk assessments.

The importance of ensuring records were kept and maintained about all decisions was also highlighted, with the need to prove both to courts and insurance companies how fire protection products and contractors were selected should an incident, or prosecution occur.

It was noted that if there are any issues with contractor management or with risk assessment or policy documents, or the way in which products have been installed and selected then that is an offence.

Also of note was that there is no legal requirement to include property protection, business continuity or the environment within a fire risk assessment. It was suggested that, with varying standards of emergency response and an increase in large loss fires due to modern methods of construction, property protection should be an integral part of ongoing fire risk assessments in the modern built environment.

While the wishes of clients to get value for money for capital outlay was recognised, all believed that it should be possible in most cases to make a good business case for appropriate levels of protection. Again it was clear that to achieve this it was necessary to have all

the key stakeholders around the table from the building surveyor to the fire specialist, the architect, the contractor and the building owner and insurer.

The solutions

Third party certification schemes were generally supported as a means of improving standards in the industry, enabling contractors to price jobs on a level playing field, thus reducing the level of rogue quotations. They were also recognised as a means of upskilling the supply chain.

However, the panel considered that anyone specifying products should understand that their liability does not end by appointing somebody that is third party approved. They must satisfy themselves that the contractor is actually doing the work they say they are doing in the way they are supposed to be doing it, by requesting test data and installation details and making sure they are installing the products that they say are essential.

It was seen as vital that such schemes were supported throughout the construction phase and requested by building owners, since it is the client which drives the building specification.

The application of Building Information Modelling (BIM) was also expected to result in reduced fragmentation within the industry, since it can transfer knowledge

▲ The assembled panel represented the entire design and build process.

throughout the construction process to the asset – which is what the client is interested in.

It was clear from all of the assembled experts that, collaborative working across the whole design and build process was vital if any improvements were to be made. Although there is significant fragmentation within the construction industry, there are existing regulations, guidance and tools in place which aim to encourage communication at every stage. Working together to promote these is key to improving the quality and safety of the modern built environment.

The issues highlighted within this question time event will be taken forward for further discussion by the panellists at a Round Table session to be held on 28 September, in support of Fire Door Safety Week. Through these ongoing discussions, the Association for Specialist Fire Protection (ASFP) aims to develop solutions to the issues identified and to offer best practice advice to all involved in the construction process.

➡ For more information, go to www.asfp.org.uk



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Effectively protecting historic buildings

From sprawling heritage sites which house our national treasures to townhouses which are home to multiple million pound flats in our major cities, the sheer number and variety of historic properties within the UK is huge. Here, Warren Moyle, Senior Product Support Engineer at Apollo Fire Detectors and Bill Jordan, Quality Manager at Firetecnic Systems, join forces to discuss the protection of these precious properties.



Warren Moyle



Bill Jordan

Warren Moyle has worked for Apollo Fire Detectors since 1998. In his current role of Senior Product Support Engineer, he is continually supporting Apollo's customers with specifying, testing and installing all of Apollo's product range.

Bill Jordan is Quality Manager at Firetecnic Systems, an LPS1014 accredited Fire Safety company. He has designed the Fire Detection & Alarm Systems in some of London's most well-known structures, including HMS Belfast, Buckingham Palace, Westfield London and Tower Bridge.

Background

Protecting heritage properties is a complex challenge which must be taken seriously, with a number of factors to consider. Life safety should always clearly remain paramount to any system specification, but it's a sad fact that any fire occurring in a historic building will most likely result in the loss of priceless and irreplaceable contents, as well as run the risk of structural damage and loss of architectural features.

But, as well as the usual need for early warnings of fire, designers of a fire detection system for a heritage property also need to take into consideration a host of other factors. One of the main

considerations is the need to avoid false alarms, particularly as many of these heritage buildings are either tourist attractions which enjoy a high number of visitors or flat conversions which house a number of residents.

Old building challenges

The age of historic buildings lends itself to a number of challenges. Buildings of cultural heritage were constructed under different, if any, rules and often with no building or safety standards. Although most of them were originally built as homes, historic buildings are now used in many different ways. Many house a lot of modern equipment such as computer systems, generators and catering facilities.

Not only does this impact upon the fire detection systems used, but

it means that considerable work needs to be undertaken by fire safety specialists to ensure that an effective fire evacuation strategy is in place.

The nature of heritage buildings means that they are often subject to maintenance works being carried out. Ironically, it is these works, often to preserve/repair a building, which can present risks that need to be factored into the design of a fire detection system. Hot works during maintenance and repairs, such as welding and soldering, present a major fire risk, particularly when used around combustible materials such as wooden beams, thatch, and old furnishings.

Aesthetic challenges

Another less critical, but still significant, issue is that of aesthetics, especially in buildings which have focussed on preserving the historical and archaeological integrity of their listed sites.

Firetecnic has a wealth of experience in balancing the fire protection needs of a site and ensuring compliance with insurance companies and/or building authority standards with the need to make its detection systems as unobtrusive as possible.

One of the most popular ways of ensuring this is by housing the most obvious of the system elements within specially designed housings. As an example, we recently worked on an old manor house where the owner was keen that the sounders within the library were as inconspicuous as they could be. To achieve this, we positioned these sounders within hollowed out old leather books – with their leather spines and matching height, the result was a totally hidden set of sounders, completely blended with their surroundings. Another client who owns a property near to Harrods commissioned an architect to build a pair of walnut cabinets – one houses his control panel, whereas the other is for his own use but the visual impact of both together is impressive. We're currently exploring a similar option for a historic church where the fire brigade has ruled that the control panel must be positioned within the entrance, but doing so would spoil the look of this lovely old building.

Where logistics and budgets don't

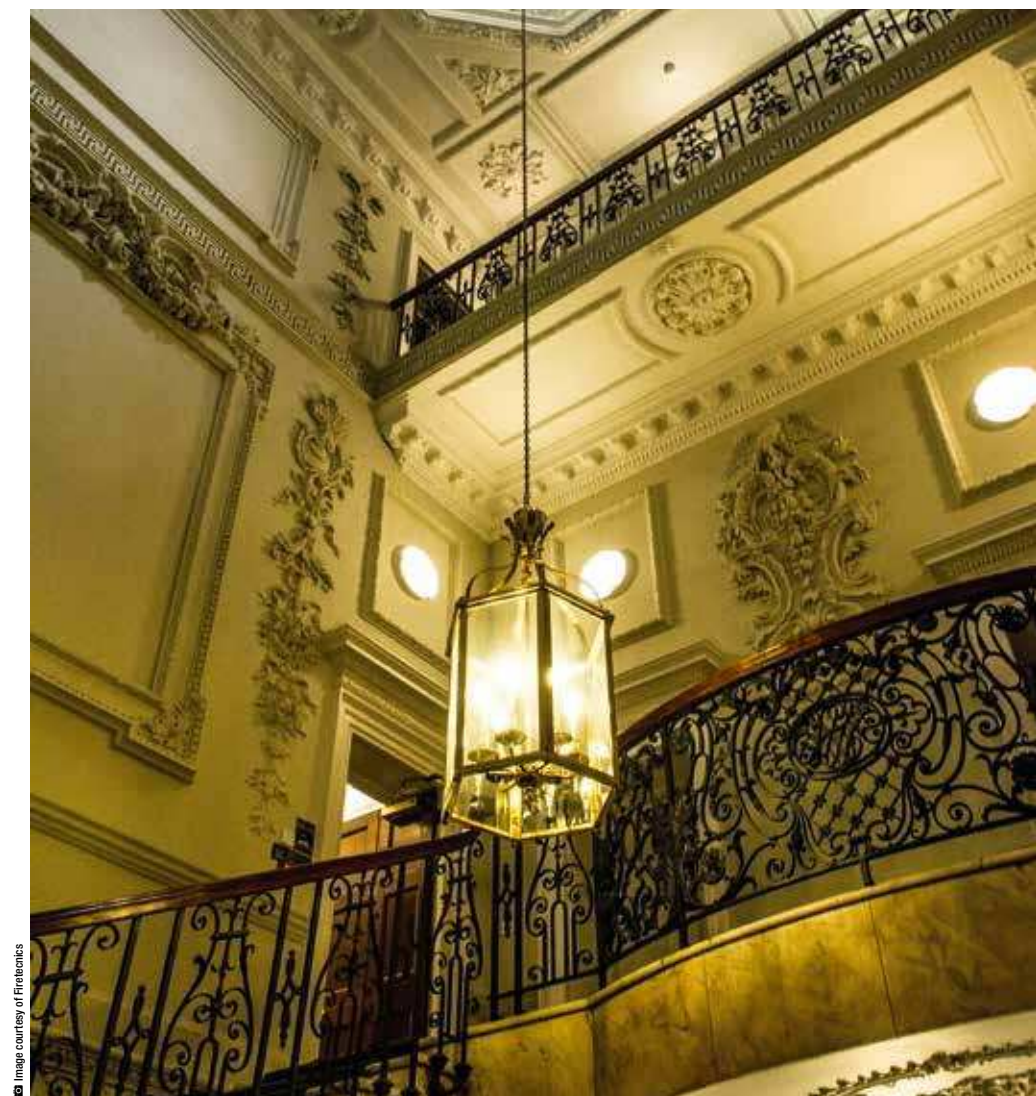


Image courtesy of Firetecnic

▼ Wireless detectors protect historic stairwell.

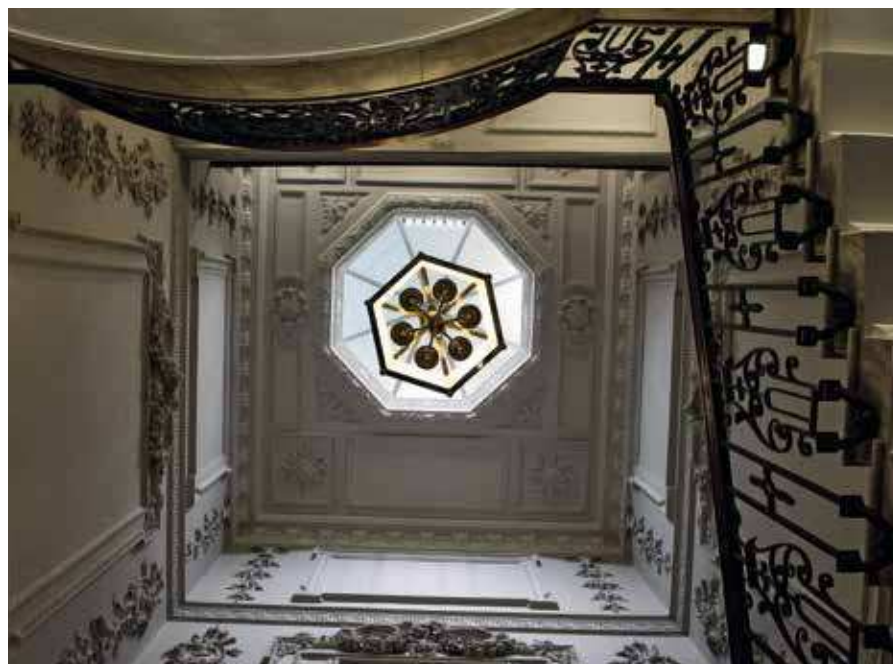


Image courtesy of Firetecnic

▲ Wireless fire protection in line with building regulations.

allow for total concealment, there are a number of clever ways of making fire detection as discreet as possible. It's an established fact that the human eye is automatically drawn up to the centre of a room, so by positioning elements in the corners of a room, rather than the middle, the visual impact is less noticeable. We also use techniques such as placing detectors above top picture rails, lining them up in even numbers by plaster detailing and positioning sounders behind the thick curtains that are often found in heritage properties. While more sounders are needed to effectively do the job, this cost is often justified by the aesthetic gain.

There's also the need to be flexible and adopt a common sense approach within historic properties, while still meeting fire regulations. We worked on one old building which had been converted into flats and had a beautiful 200-year-old wooden door which, ideally, would have been a fire door. The owner

of the building was obviously very keen to keep the door, so we used the very simple solution of placing a detector directly either side of it to maximise fire and smoke detection in its vicinity.

MCPs are probably the most challenging aspect as, by their virtue, they are the one element of a detection system which needs to be visible. Even in a converted house where residents are aware of what they need to do in an emergency, there still may be visitors to the building who need to know how to activate an alarm system, and within historic buildings which are open to the large number of public visitors, this visibility is even more crucial. While we can't "hide" an MCP, it is certainly possible to blend them more into their surroundings – examples of this include mounting them on material which



▲ Historic ballroom transformed into a modern office.

matches other aesthetic detailing in the property, such as brass plates, or even making a framed surround to make the contrast between the wall and the MCP less striking.

Identifying the best technical solution

Although the approach to historic building fire detection needs to be tailored to fit a range of specific criteria, the most popular product type Apollo specifies for such applications is a multisensor range such as our SOTERIA® collection which can be programmed to switch “smoke” sensors over to “heat” sensors at different times of the day.

The range uses new optical sensing technology, PureLight®, to detect smoke particles entering its chambers – a unique system marking a new stage

in the development of advanced optical technology which increases the reliability of fire detection while resulting in fewer false alarms, making it ideal for the challenges often presented by heritage properties.

A number of other technical developments have been integrated into the SOTERIA® design, including an advanced technology chip sensor to significantly improve smoke detection and a sleek low profile design which means that less dust penetrates the outer casing. We have also designed the detectors to be less sensitive to any dust that does accumulate over long periods of time.

We have worked quite closely with English Heritage in the past and a lot of their sites are remote and in countryside settings, making them open to issues with bugs. The bug screen inside the SOTERIA® detector has been successful in keeping insects out of the optical chamber. Careful design of the optical chamber also ensures that any insect

small enough to penetrate the mesh barrier has fewer opportunities to interrupt the operation of the smoke detector.

Another alternative for heritage buildings is our wireless intelligent XPander range of detectors. Wireless detectors are a great way of providing effective fire detection whilst minimising the presence of visible wires and cables in architecturally-sensitive buildings and avoiding invasive drilling. An example of XPander being specified for a heritage building can be seen in Exeter Cathedral. The building is one of the finest examples of Gothic architecture in the country, featuring the longest uninterrupted stretch of decorated vaulting in the world. Heritage Lottery Funding was secured to transform the upper floor of the cloisters into a dedicated space providing modern learning facilities, whilst retaining the historic legacy of the building. XPander was installed to provide fire detection as part of this programme of works without compromising the aesthetics of the ceiling.

Conclusion

From a manufacturer’s point of view, it is also crucial that we work within our capabilities to ensure that we make our detection systems not stand out like a sore thumb and, from an installation and design perspective, that we strive to provide clever solutions to conceal and minimise a detection system’s visibility. With this in mind, it’s no wonder that it’s common to hold four or five site meetings with property owners, management companies and guardians before we even put pen to paper to provide designs and costings.

Each historic building is unique, and whilst we can’t advise on a “one size fits all” system, our many years of experience have shown that the best approach is often to opt for either the reliability and flexibility of a multisensor system, the discreet option of a wireless solution or, indeed, a combination of the two. By working closely together, Apollo and Firetechnics can continue to ensure effective fire detection, whilst remaining sympathetic to helping to maintain a building’s visual historical integrity.

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Istanbul Aydın University: Cerberus Pro for maximum safety

Istanbul Aydın University (IAU) had enormous problems with false alarms caused by its old fire safety system. To ensure reliable protection for the expansive campus consisting of ten buildings – ten faculties and a large technology center – the private university opted for a Cerberus Pro fire safety system from the Siemens Building Technologies Division.

The safety of students, staff and visitors has the highest priority for us,” said Mustafa Aydın, Board of Trustees Chairman at Istanbul Aydın University. Founded in 2007, the school currently has 34,000 students. The previous fire safety solution was a mix of several systems from different suppliers, which resulted in multiple false alarms. This not only affected operations at the university but also posed a significant safety risk: If false alarms occur frequently, it becomes likely that people do not respond adequately in an emergency because they no longer assess the danger correctly. For

this reason, IAU decided to replace its old fire safety system with a state-of-the-art solution from a single supplier.

Protecting people, buildings and assets at a university is extremely important – and a major challenge. A university campus typically consists of many different buildings, with each area – from laboratories to auditoriums to the cafeteria – requiring different things from a fire safety system. For this reason, Istanbul Aydın University needed a flexible solution. Another key aspect was to be able to centrally monitor the entire system from the university’s security command center.

In addition, it was very important to quickly install and commission the system during the semester without any interruption to campus life. And finally, the new fire safety system had to eliminate the frequent false alarms.

In light of these requirements, Siemens Solution Partner infoMET Technologies recommended that IAU replace its existing systems with the proven Cerberus Pro solution from Siemens. This comprehensive, EN 54-certified fire safety system can be tailored to demanding environments such as universities where a variety of challenging areas require



Image courtesy of Siemens



Image courtesy of Siemens

different approaches. What makes this possible is the patented ASATEchnology from Siemens. It uses advanced signal analysis and parameter sets that can be adapted to each concrete situation in order to detect smoke, heat and carbon monoxide extremely quickly and reliably. Fire detectors equipped with ASATEchnology interpret the captured signals in real time, and the selected parameter set dynamically adjusts to the current situation. As a result, detectors with ASATEchnology respond more sensitively in case of fire and are more robust when deceptive phenomena occur.

Among other things, the Cerberus Pro modernization allows a stepwise move to the latest fire safety technologies. For example, replacing the old fire detectors and control panels in several independent phases ensures that the system operates reliably at any given time and offers maximum protection while minimizing disruptions to university operations.

As a pilot project, the main building at Istanbul Aydın University was modernized first. The entire fire safety system and all cabling were updated and a new fire control

panel was installed. The modernization with Cerberus Pro was completed within just ten weeks and handed over to the customer. Impressed with the outcome of the pilot project, IAU decided to equip the entire campus, including newly constructed buildings, with Cerberus Pro from Siemens.

The modernization project accommodated the different needs of the various campus areas. 1,500 smoke detectors were installed campus wide, as well as 50 multisensor fire detectors in areas with special requirements and one fire control panel in each building. This allows all alarms to be monitored around the clock, both locally and from the security command center. “In addition, the customer is able to check the system through remote access,” explains Bahar Kiliç, project manager at infoMET Technologies. “This allows for full control and rapid intervention in case of an incident.” If a fire does break out, Cerberus Pro also controls elevators and access doors and issues customized instructions through the public address system in each building.

The modernization of the fire safety system at Istanbul Aydın University was

▲ 1500 smoke detectors from Siemens protect the Aydın University from fire – and false alarms.

completed successfully after just 28 months. Both the customer and Siemens partner infoMET Technologies were extremely satisfied. The executives at IAU were very happy to receive a highly reliable fire safety system with maximum immunity to false alarms and low maintenance costs. Dr. Mustafa Aydın added: “Currently, we are constructing additional buildings on our campus. Since we are very satisfied with the performance of the system also the new buildings will be equipped with Cerberus Pro from Siemens.” When asked why they recommended Cerberus Pro to their customer, Bahar Kiliç, project manager at infoMET Technologies, replied: “We have been working with products from Siemens a lot and know that they are absolutely reliable, there are no false alarms, and they are flexible in their use in different applications.”

➔ For more information, go to www.siemens.com/buildingtechnologies

An integrated approach to false alarm management matters

False alarms from fire systems are one of the biggest issues in fire today. They have severe financial implications, can impact the effectiveness of fire planning in any building and cause widespread inconvenience.



Aston Bowles

The good news is the latest developments in fire system technology offer a number of solutions that can drastically reduce false alarm occurrences. This has been led by the development of a new generation of fire panels and high performance detection methods, which use cause-and-effect programming and human input to directly address the issue of incorrect activations.

The primary aim of these new innovations is to confirm the existence of a genuine incident prior to the next stage of the building evacuation strategy being implemented. The secret to successful false alarm reduction is to get the strategy right, which can then be used to develop the optimum configuration options for

▼ Care homes and other residential environments are particularly prone to false alarm incidents.



the system. This comes from the risk assessment and should be considered long before any specification is released.

Each building will have different users and specific circumstances that may require very different verification and investigation processes, as well as unique requirements for evacuation. They can all impact the other. Factors might include the design of the building, its purpose, the location, and the number of floors, so flexibility is key to an effective strategy.

The industry has adopted two primary approaches to address false alarms. Some systems are more focused on technology in the detector heads that works to identify false signals, while other systems concentrate on processing and interpreting signals from loop devices and making decisions in the fire panel. Some progressive manufacturers, Advanced being one, are combining

the two into an integrated approach, attacking the causes of false alarms from many directions.

The development of intelligent detectors, which use advanced detection methods and smart algorithms to help differentiate between real fires and false signals, perhaps caused by steam or cooking smoke, has led to a real reduction in false alarms.

However, detectors do not need to be state of the art to make a real difference when married to an intelligent panel. Multimode detectors, for example, can be used to great effect. If the panel will support mode switching, the operating modes of these detectors can be switched between heat and smoke in order to confirm the validity of a signal.

Detectors can also be combined to work together using double-knock or coincidence detection to confirm a genuine alert. While modern detectors offer a superb solution, the best systems use both detection and fire panel technology to address false alarm challenges.

Automatic, addressable fire systems can take detector signals and use them to trigger a range of confirmation and verification procedures. The power of the integrated approach is that it develops and shares more information and allows many more inputs and outputs. These can be combined, usually automatically, but in certain circumstances manually, to significantly reduce false alarms.

Modern fire systems are highly efficient, with loops and networks having the power to cover large distances, allowing a single configuration programme to cover a whole network and site. The configuration options on a network can be huge, so simple programming methods are important. If it's complicated, the chances of errors may increase.

This comes with a downside; the larger network allows genuine site wide coverage, but the specified system must also allow very fine control of false alarm verification, often by point or collection of points, and will probably require the sub-division of a system beyond simple zones.

Equally, a large network must not suffer from slower speeds. One of the key aspects of a false alarm management system is speed. Fast information from and response to inputs is vital, and on



Image courtesy of Advanced

large sites the network speed has the potential to seriously inhibit the false alarm management strategy.

The key time periods to consider in false alarm management are verification times, which occur before a latched Fire signal, and investigation delays to outputs that occur after the latched signal. Both include scope for human intervention – indeed the latter has been a mainstay of alarm management for many years.

The new area of work on verification times has been controversial because, if handled incorrectly, it could potentially delay a full and valid fire condition. The good news is that, in recent years, panel manufacturers have launched a range of methods that allow verification to be successfully and safely managed, and these are now widely specified.

The most common model uses a loop input device or dedicated repeater to extend the verification time, or to confirm that a local signal is not due to a real fire (eg. It may be due to burning toast).

The AlarmCalm Button, part of Advanced's AlarmCalm solution, allows the panel verification time to be extended (once only) by the occupant of a room if they believe the signal in their area to be false. If the signal clears, the system will reset to normal, or if it persists beyond the pre-allotted verification time, the system will go into full alarm and the next stage of cause and effect will be activated. Options for this next

▲ Examples of the MX Pro fire panel ranges from Advanced.

phase may include further investigation or phased evacuation, critically this will usually be after a latched fire condition.

When people are introduced in to the equation, failsafe procedures must be strong. The AlarmCalm button can only be pressed once before a system reset, and times are programmable. If an alarm signal has been verified by the panel, or if a manual call point is activated, the system will enter a full fire alarm condition immediately, which is why failsafe options are key, and also why the system should cater for various potential evacuation strategies.

Once a signal has been confirmed and latched on the fire system, users then have investigation delay options. Again, these must not inhibit safe evacuation, but rather enhance it.

Phased evacuation allows the fire system to be programmed dynamically to evacuate those most in danger first, sometimes to a safe area, unlike a traditional 'all out' system, which offers only single stage evacuation. The industry has also developed two stage alarms (alert and evacuate), local (staff) sounders, beacons and pagers, and panel notifications that will alert trained staff and sometimes residents to potential issues before signalling a zonal or full evacuation. Alarm signals to other

Aston Bowles is head of marketing at Advanced.

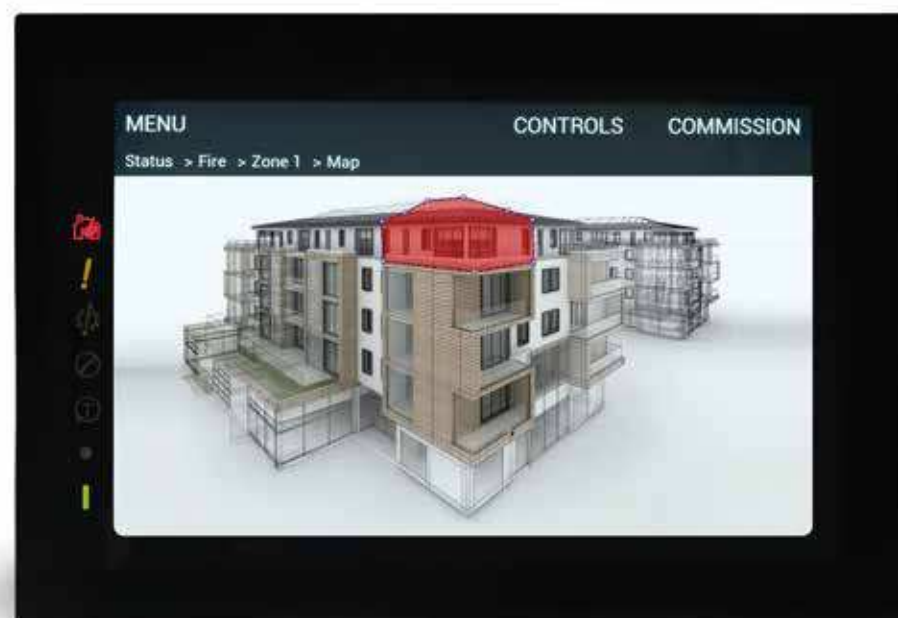


Images courtesy of Advanced

output devices, such as any automatic door release, will work independently of any evacuation delays.

Planning and thought should also be applied to how the system will be monitored, serviced and maintained. An increasing number of solutions are available that allow fire systems to be remotely monitored and controlled,

▼ Example of 3D zoning on an Advanced TouchControl RCT and repeater panel.



◀ An effective false alarm strategy is particularly important in residential environments.

they should be treated as an integral part of the design process.

Equally, priority should be given to selecting a system that is acceptably intuitive for staff and designated users to operate. The ability to share information in dynamic fire conditions has also developed rapidly, for example some touchscreen displays are a key tool that can make it easier to identify the location and status of an alarm. TouchControl from Advanced is a touchscreen repeater and remote control terminal that includes Active Maps and zone plans.

Another tool to consider, particularly across larger sites, and those with residents or overnight guests, is an automated paging system, such as Advanced's own Lifeline panel. Linked to any new or existing fire system, these can be used to ensure DDA compliance for the hearing impaired (via a bedside unit or pillow vibrator), to pass live fire system information to staff pagers, and to send pre-programmed messages to users.

These systems have a key role to play in false alarm management because they offer the potential to provide detailed information from the fire system in real time, thereby giving them the tools they need to respond and confirm the alert as rapidly as possible. They work on a secure localised UHF radio network that allows increased signal penetration for optimal building coverage.

In summary, false alarm management is not only about detector technology and selection, but also about specifying the right system to suit each site-wide strategy, which is why it should be an integral part of the design and specification process on all new and refurbished buildings, involving all key stakeholders.

The fire system requirements of any public environment, be it business or residential, are demanding, but the fire industry continues to deliver innovation with a wide range of systems and solutions to address the issue of false alarm management.

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Alarmed about steam?

False alarms, i.e. an alarm which has been generated by the fire detection system but not in response to an actual fire, are one of the biggest issues faced by the fire industry. It's a well quoted figure, but worth remembering, that false alarms cost the UK in excess of £1 billion each and every year. That figure has been calculated from loss of production and disruption to businesses, increased insurance premiums and the cost to Fire & Rescue Services.



Lee James

False alarms take up valuable resources of Fire & Rescue Services, made all the worse because of the 30% cut to their funding during the course of the last parliament and the subsequent loss of nearly 7,000 frontline jobs. It has become such an issue that some Fire & Rescue Services will not attend a fire alarm unless it has been verified as an actual fire. Furthermore, in England or Wales, organisations may be charged by Fire & Rescue Services if they attend a false alarm event.

For businesses and organisations of all types, false alarms not only cause an obvious loss of earnings but can also impact on customer experience, especially for those that have people sleeping in them; no one wants to be woken up in the middle of the night and have to evacuate in their PJs!

▼ Dual Optical alarms can distinguish between smoke and non-combustion products such as steam, aerosols and dust, thus reducing false alarms caused by these.

Minimising the number of false alarms is therefore a top priority for all concerned.

Automated Fire Detection systems can be designed to include sophisticated techniques to avoid false alarms, including filtering signals at the control panel. The control panel could be configured to deactivate certain zones at pre determined times when false alarms are most likely to occur, or set delays before an alarm is sounded to allow for investigation. However, these don't really solve the problem – they are more of a sticking plaster. Instead, it would be preferable to actually stop the false alarms in the first place.

Not enough is known about the causes of false alarms, although the Building Research Establishment (BRE) has made headway. In its briefing paper 'Live investigations of false fire alarms' – reporting on a research project carried out with Scottish Fire and Rescue Service – the main causes of false alarms reported were, in decreasing order of occurrence: Unknown, Fault, Dust, Cooking, Weekly testing, Accidental activations, Steam, Aerosol and Water ingress.



Image courtesy of Nittan Europe Ltd

Lee James is the General Manager – Sales and Marketing, Nittan Europe Ltd.



Images courtesy of Nittan Europe Ltd

Steam as an identified cause of false alarms is quite far down the list. For the likes of commercial buildings this is pretty understandable as there are few sources of steam. However, for organisations where people are sleeping which are likely to have en-suite facilities, as to be found in hotels and student accommodation, false alarms from steam are high up the causal list.

Best practice and relevant standards dictate that smoke detectors should never be fitted in kitchens or bathrooms. This is because these environments generate steam and cooking vapours which can be 'misread' as smoke by detectors. In a kitchen you would use a heat alarm instead. In a bathroom you would not use an alarm.

This becomes problematic in a hotel, for example, as you must have an alarm in each bedroom, but the en suite bathroom is in very close proximity. A guest who has enjoyed a long hot shower or bath lets the steam into the bedroom as soon as they open the bathroom door. This situation is compounded by the fact that in many cases the alarm needs to be close to the main door/lobby to protect the occupants escape route – which is also where you most often find the bathroom door.

▲ Prior to installing Nittan EV-DP detectors in student accommodation, the University of East Anglia was experiencing around 20 false alarms every week caused by steam.

► The Cliff Hotel & Spa have prevented further false alarm issues by using Nittan Dual Optical alarms.

Preventing false alarms from Steam

Generally speaking, the Infra Red scattered light technology currently used for commercial smoke detectors is unable to distinguish between larger size particles like steam or dust, that are major causes of false alarms, and particles generated by combustion (fire).

One solution is to move the detector further away from the bathroom. Depending on site conditions, a smoke

detector may be sited up to 7.5 metres away from a potential alarm source and still meet the British Standard. However, this could compromise safety as it's also further away from the escape route (i.e. the door). There's also a not inconsiderable cost element to this solution, from moving the devices and cables to redecorating afterwards to cover up where the alarms had been previously; not to mention the potential disruption and loss of earnings for a



► Nittan has been at the forefront of the international fire protection industry since 1954.



Image courtesy of Nittan Europe Ltd

business. And there's still no guarantee that the steam wouldn't affect these devices in the new location.

You could adjust the detector performance, usually at the control panel, for given periods. This might involve switching a smoke/heat detector to heat only mode or simply reducing the sensitivity of the detector. Both of these approaches compromise safety to a degree.

A further option is to use a Multi-Sensor. Unlike single sensor based detectors, a Multi-Sensor combines two sensing elements, usually optical and heat. It interprets the signals from both sensors to get a better understanding of what's really happening in the immediate environment. Due to this, it benefits from a quick response to both slow smouldering and fast flaming fires yet has greater immunity to false alarms. It's a better option, but 'greater immunity' may not be good enough; Multi-Sensors are still somewhat susceptible to false alarms caused by dust and steam.

A Multi-Sensor is based on the principle of 'two is better than one'. The other detector based solution open to you uses the same principle but in a different way, based on Gustave Mie's theory on particle light scattering (published in 1908 but only made possible in modern times through the increase in computational power and micro processors which allow for relatively complex algorithms in sensor heads). Dual Optical alarms use a single sensor type – optical, which 'looks' for

smoke using a scattered light beam in the sensing chamber. Instead of just using the standard Infra Red light, it also employs blue LEDs to provide a more accurate measurement of particles within the chamber. By calculating the ratio of these light sources, which operate at different wavelengths, the detector can determine the particle size and thus distinguish between smoke and non-combustion products such as steam, aerosols and dust. This technology is incorporated into Nittan's Evolution EV-DP and EVC-DP detectors. It reduces false alarms caused by all these mediums, but the detector remains sensitive to combustion products to generate an alarm. In addition, the detector has been made more sensitive to flaming fires by shifting the alarm threshold level when the ratio of the two scattered light wavelengths indicate that the particle size present is similar to the smallest size defined as a smoke particle.

The University of East Anglia's (UEA) student accommodation is a good example of the issue of false alarms caused by steam. UEA was experiencing around 20 false alarms every week caused by steam escaping from the bathrooms and activating the smoke alarms. Each alarm event has to be checked and verified by security personnel before Fire & Rescue Services will attend. A reduction in false alarms was therefore not just convenient, but also had significant cost and time benefits.

Greg Smith, Director of Global Fire Services who was brought in by UEA

to address the issue, explains further: "Originally the plan was to relocate the existing detectors further away from the bathrooms. Whilst this would provide the same level of fire protection, it would be quite a costly solution as it would not only involve moving the devices and cables, but also redecorating afterwards to cover up where the alarms had been previously. We were also concerned that the steam would affect these devices in the new location. As the existing alarms were coming to the end of their lives anyway, we recommended instead swapping to Nittan's EV-DP smoke detectors which easily cope with steam."

Global Fire Services replaced the existing smoke alarms in the student accommodation with more than 2500 Nittan EV-DP detectors in the summer holidays throughout the 24 accommodation buildings spread across the 320 acre UEA campus. 12 months on and, according to Steve Edwards, Electrical Design Engineer, Estates and Building Division at UEA, there have been no false alarms due to steam. "All accommodation blocks now have Nittan alarms installed, with further alarms being fitted in to 531 bedrooms. Security is very satisfied with the results."

The Cliff Hotel & Spa in Cardigan, West Wales experienced similar problems. A large family-owned hotel, the Cliff Hotel features 70 en-suite bedrooms, spa and gym facilities, function suite and a golf course. The hotel had been experiencing a number of issues of false alarms, primarily caused by steam escaping from the en-suite bathrooms and activating the smoke alarms. The installer, Fire and Security Alarms Ltd., was familiar with the problem and replaced the existing alarm system with a Nittan Evolution system including over 200 EV-DP dual optical smoke detectors. The new alarms have prevented further false alarm issues for the hotel.

Fire detection and alarm systems are absolutely essential, but no one should have to put up with false alarms. If you have a fire detection system that is causing disruption as a result of false alarms, take action. False alarms, especially from steam, don't have to be a headache!



For more information, go to www.nittan.co.uk

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Storage sprinkler design: a historical perspective – Part 1

The automatic sprinkler system is the most commonly used fire protection system for industrial and commercial occupancies. Sprinkler systems were first employed in the early 20th Century to protect the equipment and textile goods stored in multi-story textile mills. Ceilings in such buildings were low and goods were mostly stored in wooden crates. Designed to project approximately half of the water to the ceiling and half toward the floor, an important function of those early sprinkler systems was to wet and protect the combustible ceiling structure.



Simon Ouellette

This design philosophy was changed when Factory Mutual (FM) introduced the spray sprinkler in the 1950s. At that time, it was recognized that applying water directly to the ceiling was not necessary, provided that high ceiling temperatures could be avoided and the spray from each sprinkler could be more efficiently distributed over a larger floor area. The new spray sprinkler was designed to project all the water downward toward the fire on the floor. Featuring a K-factor (discharge

coefficient) of 8.1 and a nominal orifice diameter of 13 mm, these sprinklers were more than adequate to provide fire protection for the industrial occupancies of that time.

Changes in manufacturing and storage practices

Industrial, manufacturing and storage occupancies have undergone dramatic changes in the interim decades. The proliferation of plastics in packaging materials and the increased use of cardboard cartons created entirely new, unprecedented challenges for fire protection sprinkler systems to overcome. These newer, lightweight storage materials allowed for storage racks to be built to greater heights and changed the

▼ The proliferation of plastics in packaging materials and the increased use of cardboard cartons created entirely new, unprecedented challenges for fire protection sprinkler systems to overcome.



Simon Ouellette is Engineering Manager for Victaulic.

dynamic of how storage spaces were designed. Taller storage racks create a 'chimney effect' when their contents burn, changing the way fires grow and increasing the challenge for adequate sprinkler protection. In addition, plastic materials generate more heat than previously used manufacturing materials when burned, increasing the hazard.

Overall, fires in a rack storage environment are characterized by extremely fast fire growth, high heat release rate and high plume velocity; and have therefore challenged the standard sprinkler to its limit of effectiveness. In some cases, combustibles are stored on solid shelves in their rack arrangements or the storage height and commodity fire challenge are beyond the effectiveness of ceiling-based sprinkler systems. In these instances, in-rack sprinklers are needed to provide sufficient fire protection.

Under these more challenging circumstances, a standard sprinkler system is required to supply a relatively large number of sprinklers with sufficient water to control and limit the fire spread within a particular design area by keeping the surrounding combustibles wet enough so that they do not ignite. In the years following the adoption of the spray sprinkler solution, it became evident that sprinkler system design requirements for each storage condition had to be individually determined.

In 1967, FM built a large sprinkler fire test facility in the United States to seek solutions for fire protection challenges of storage environments through large-scale fire tests. Two fire test programmes – for rack storage and for plastic storage – were conducted from 1968 to 1972.

To provide the data needed with a reasonable number of fire tests, a concept called 'parallelism' was adopted by the FM steering committee which involved establishing a base density (water flux) versus area of demand curve for a standard test commodity and a set of test conditions utilizing a given brand of sprinkler. Additional curves for other stored commodities, storage conditions, and sprinkler variables – such as aisle width, type of storage rack and sprinkler temperature rating – were then constructed by drawing a parallel to the base curve through a single test point of the new commodity and test variables.



Image courtesy of Victaulic

All the tests were conducted with the ignition source centered below four sprinklers. By definition, the density/area rule assumes that – for a given density – the performance of all listed sprinklers in a given category would be the same, regardless of their manufacturer, orifice size, spacing, or pressure.

Unfortunately, over the years, test results have shown that different sprinkler models and ignition locations can cause significant differences in area demands. In addition, the density/area rule which has been used as the basis of traditional sprinkler system design is not always appropriate for modern storage protection.

Furthermore, fire tests in the 'Plastic Storage Programme' at FM revealed that rack storage of a plastic commodity over

▲ Newer, lightweight storage materials allowed for storage racks to be built to greater heights.

4.5 m in height could not be protected with a ceiling-based sprinkler system alone, using the standard sprinklers. The standard sprinklers at the ceiling needed to be supplemented with in-rack sprinklers, in order to adequately control the fire. In-rack sprinkler systems are susceptible to damage by warehouse operators and create inflexibility in warehouse storage reconfiguration. To warehouse owners looking at cost-effectiveness and future expansion or reconfiguration, it is highly desirable to have ceiling-only sprinkler protection.



▲ The design goal of large-drop sprinkler systems was to provide a minimum number of sprinklers operating at a minimum pressure for a specific occupancy and commodity class, storage height and storage arrangement.

◀ As the storage height increases, the fire challenge becomes greater.

Large-drop sprinkler development

In response to the need to provide fire protection for 9 m high warehouses containing storage of cartoned plastic up to 6 m high, the large-drop sprinkler was developed in the mid-1970s. This sprinkler had a nominal orifice diameter of 16mm and a K-factor of 15.9, compared with the large-orifice sprinklers that featured an orifice diameter of 14 mm and a K-factor of 11.5. At a given discharge pressure, this large-drop sprinkler delivered a larger quantity of water and larger droplet sizes than the large-orifice sprinkler and demonstrated the superior performance that was expected.

The design goal of large-drop sprinkler systems was to provide a minimum number of sprinklers operating at a minimum pressure for a specific occupancy and commodity class, storage height and storage arrangement. This approach differed from the traditional density/area approach (sprinkler water flux density over sprinkler operation area), allowing the sprinkler design density (sprinkler discharge pressure) to decrease as the sprinkler operation area increases.

➔ For more information, go to www.victaulicfire.com

To respond to this need, new sprinkler technologies came into the marketplace. For protection of 6 m high rack storage of cartoned plastic commodities under a 7.5 m high ceiling, large-orifice sprinklers with a K-factor of 11.5 and a nominal orifice of 14 mm were developed. As the storage height increases, the fire challenge becomes greater for the ceiling-only sprinkler systems and more water is required to be discharged from the ceiling sprinklers to protect the stored commodities. With the available pressure from the water source as a fixed value, the sprinkler orifice needs to be increased to provide a higher discharge rate. This relationship between storage height, available pressure, sprinkler orifice size and K-factor has been understood by sprinkler designers for decades.

Measurement of the effectiveness of storage sprinklers

In response to these ongoing challenges, an additional, more comprehensive series of research programmes were conducted by scientists and engineers at Factory Mutual from the 1970s through the 1990s, exploring the principles of sprinkler performance in rack storage fires. These research programs included:

Response Time Index (RTI):

a measurement of the sprinkler's response sensitivity to the gas temperature and velocity in the vicinity of the sprinkler as the fire grows large and hot enough to activate the sprinkler

Prediction of fire size at sprinkler actuation:

developing correlations of fire plume and ceiling flow, and sprinkler response model using RTI and ceiling flow correlation

Required Delivery Density (RDD):

determining the water flux required to be delivered to the top surface of a burning array to achieve fire suppression.

Actual Delivery Density (ADD):

measurement of the actual water flux delivered by the sprinkler to the top surface of a burning array that penetrates the fire plume – dependent upon water droplet size, spray pattern, discharge rate and fire size.

Aided by these scientific principles, the desired effectiveness of sprinkler fire protection could be targeted and the optimal use of water quantity could be determined, resulting in optimized, cost-effective sprinkler protection of a range of commodity storage in warehouses.



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Mobility scooter fires: Sprinklers can save lives

London housing provider, Lewisham Homes, has partnered with the London Fire Brigade, the Building Research Establishment (BRE) and British Automatic Sprinkler Association (BASFA) to carry out world first experiments in fire safety. The tests examined how effective residential sprinkler systems are at suppressing mobility scooter fires.



Dominic Johnson



Lucy Wines

Dominic Johnson
Head of Health, Safety & Compliance – Homes for Haringey Former Head of Health & Safety – Lewisham Homes.

Lucy Wines
Communications Officer – Lewisham Homes.

Background

The general increase and use of mobility scooters has presented challenges to housing providers throughout the UK about how the risk of fire associated with these vehicles should be managed.

Steve Kilden, Fire Safety Advisor for Lewisham Homes said:

'A growing number of people need to use mobility scooters. Because of this we've had to look at where our residents can safely store and charge their scooters and how we can reduce the fire risk.

We're aware there have been a number of fires involving mobility scooters reported and this risk is recognised by fire and rescue services and other agencies.

Mobility scooters come in various sizes, materials and designs. The

introduction of an unknown level of fire loading into a building presents a high level of concern and potential obstruction to the means of escape. The risk of an electrical fault occurring whilst the batteries are being charged or from deliberate ignition has to be seriously taken into account.

With the recent use of lithium-ion batteries instead of lead-acid batteries to power mobility scooters, the hazard is increased due to the battery's unpredictable and highly volatile reaction when subjected to heat. The risk of explosion is a real possibility'.

Lewisham Homes has considered and provided different ways for their residents to store their mobility scooters, including purpose built external storage areas. The provision of alternative storage space does not however offer the close proximity which residents want or need to access their scooters.

This difficulty in finding an answer

▼ The seat of the mobility scooter catches fire during Experiment 1.



Image courtesy of BRE

to safely and conveniently store mobility scooters inspired the housing provider to re-think their approach. Could sprinkler systems installed within sheltered housing schemes for older people offer a better solution?

Steve Kilden told us:

'We asked the BRE to help us identify whether sprinklers, combined with other safety measures, would support our aim to allow residents to store and charge scooters internally within dedicated communal areas'.

Lewisham Homes brief to the BRE was to assess how effective retro-fitted domestic sprinklers systems are at containing or extinguishing a mobility scooter fire. The outcome of the experiment would assist Lewisham Homes in deciding whether to allow the internal storage and charging of mobility scooters within their housing.

Planning

Plans of the proposed storage areas together with the designs of the sprinkler systems installed at a number of sheltered schemes were provided to the BRE.

Domestic Sprinklers, who retrofitted the sprinkler systems, had confirmed

these installations were carried out to the relevant British Standard.

The BRE constructed a life-sized mock-up of a shared room in one of the housing schemes using the same sprinkler arrangement.

The particular room layout used for the experiment was chosen because it presented the most challenging conditions, with the area covered by a single sprinkler head.

Method

A textile strip soaked in a small amount of accelerant was ignited and placed close to the scooter's battery compartment to simulate a fire started by an electrical fault.

For both experiments the door to the mock-up compartment was kept open because this would create even more severe conditions and allow those present to observe what was happening in real time.

The scooters were not charged or plugged into the electricity mains during the experiments.

The experiments were planned to continue for 30 minutes after the sprinklers activated. This was agreed with Lewisham Homes as being the minimum period for

▲ Steve Kilden, Fire Safety Advisor for Lewisham Homes, visits a housing scheme where older residents store their mobility scooters in an internal shared area.

which the domestic sprinkler systems are designed to operate.

Temperatures during the experiment were measured by thermocouples fitted on trees, each fixed at various heights and in different locations within the compartment. This allowed for accurate temperature readings to be recorded around the mock-up room during the fire.

Experiment 1

The first experiment involved a single mobility scooter with a standard lead-acid battery which was placed in the corner of the mock-up room at the furthest distance from the sprinkler head. The seat of the fire was set to replicate a fire starting within the battery compartment of the scooter.

After about two minutes black smoke started to emerge from the room. After 5 minutes the fire was seen to grow, with flames spreading to the seat of the mobility scooter which caused the temperatures to significantly rise. After 6 minutes the battery housing was well alight and large volumes of hot, thick black smoke were



▲ Damage to the battery casing caused during Experiment 2.

emerging. At 6 minutes the gas layer next to the sprinkler head was recorded at 68°C and within a further 30 seconds the sprinklers started.

Almost immediately after the sprinklers started, the thick black smoke transformed into plumes of grey smoke which meant that no more useful visible observations could be made.

The sprinkler was turned off after 3 minutes to see if the fire had been suppressed. Soon after shutting down the sprinkler, it was apparent that the fire started to redevelop and, after 9 minutes from ignition, the fire continued to grow and completely engulf the scooter. Temperatures within the room by this time had reached a staggering 780°C. After 11 minutes 30 seconds the scooter fire was manually extinguished.

Experiment 2

The second experiment involved three mobility scooters, one of which was fitted with a lithium-ion battery. The scooter was placed in the corner of the room. To imitate an even more challenging incident, the two remaining scooters were positioned close to the first and in such a way as to shield the initial scooter from the sprinkler head spray pattern.

A new sprinkler head and cover was fitted following the first experiment. The fire was ignited in just the

scooter containing the lithium-ion battery because, except in the case of arson, it was considered highly unlikely a fire would develop in more than one scooter at the same time.

Unlike Experiment 1, the fire spread to the seat more rapidly and higher temperatures were recorded at an earlier stage of the experiment. Observers were required to stand in a safe position and away from the room opening due to the unpredictable reaction of the lithium-ion battery. At about 2 minutes 50 seconds the temperature close to the sprinkler head had reached 90 °C and the sprinkler activated.

The sprinkler was left on for 10 more minutes and the experiment was then stopped as it appeared the fire had been suppressed or probably extinguished.

Heavy damage was noted to the battery cover and the lithium-ion battery itself but there was no explosion. The fire did not spread to the other two mobility scooters.

These experiments provide the following key learning points:

- Even if two mobility scooters are ignited at similar points using identical ignition sources, the fire behaviour and the speed of temperature rise can be significantly different.
- The sprinkler system did effectively contain both fires before reaching critical stage.
- Additional control measures will need to be considered to mitigate and

deal with the large volumes of smoke given off prior to the activation of the sprinkler system.

- With the increase in use of these vehicles and the associated fire risk, education and advice around safe use and storage, including managing an appropriate fire safety regime, is essential.

The experiments were attended by the London Fire Brigade. Dan Daly, Assistant Commissioner for Fire Safety, said:

'The action already taken by Lewisham Homes to protect older residents by installing sprinklers in their housing schemes should be applauded. Their latest plans around the storage of mobility scooters recognise there is a need to help residents lead independent lives without compromising their safety.'

Working with the London Fire Brigade, Lewisham Homes is using the results of the experiments to help shape fire safe safety provisions for their new build homes, sheltered accommodation, flats and converted properties.

The experiments provide valuable information and can be regarded as a benchmark for the housing and fire safety industries alike.

Catherine Goakes, Interim Head of Health and Safety at Lewisham Homes said:

'We wanted to find out whether or not sprinklers could successfully suppress mobility scooter fires. Our tests have shown that they can. We are proud to be leading on solutions to this current and growing fire safety risk.'

The experiments and their results are part of ongoing efforts by Lewisham Homes to improve fire safety for their residents. The housing provider has invested more than £13 million over the past 7 years to improve fire safety standards. This has included the installation of sprinkler systems, fire alarm systems, fire doors and raising the awareness of fire safety by sharing improved information with residents.

The BRE Global Client Report: Fire experiments on mobility scooters protected by sprinklers and a short film made by Lewisham Homes about the experiments are available to view now.

➔ For more information, go to www.lewishamhomes.org.uk

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Stop turning skills shortages into a crisis

Recruiting engineers with the right skills can be a real nightmare for any organisation responsible for maintaining alarms and other fire protection equipment. For a start, it's well known that there's a global deficiency of skilled engineers – and in some countries such as the UK this shortage is reaching crisis point. In a survey of British engineering firms by the Institution of Engineering and Technology (IET) over half reported that they couldn't find the engineers they were looking for and well over half said that this was a threat to their business.



Keith Minster

An international study by recruitment specialist Manpower came to similar conclusions on a global scale – finding that skilled trade jobs are the most difficult to fill with engineering positions (especially electrical) at number three in the 'top ten' of shortages.

But scratch beneath the surface in the fire protection business and you'll find that the situation is actually more complex.

▼ Fire alarm systems have become increasingly sophisticated, optimising the benefits of the cloud to deliver real-time information via laptops, tablets or smartphones.

While both experience and traditional skills remain important, increasingly engineers in this sector need to add entirely new skills to add to their existing knowledge. These new demands could add to the existing skill shortages and turn the problem into a crisis.

Engineers working in the security sector have always needed sound IT knowledge, but until recently fire alarm specialists have relied on straightforward electrical and mechanical skills alone to carry out maintenance, although they may have basic computer skills to schedule work, produce reports and invoices.

However, fire alarm systems have

become increasingly sophisticated, optimising the benefits of the cloud to deliver real-time information via laptops, tablets or smartphones. They are becoming part of a wider Internet of Things network as an increasing number of products connect to other devices and the data collected is being analysed to inform decisions, to prevent system failures and improve compliance.

It's all driving an urgent need for fire alarm maintenance engineers to upskill. Otherwise, there are many IT firms who would love to extend their reach and fill the gap. But, these won't necessarily have the experience of compliance issues or other fire alarm system specific challenges. So aside from the implications for the testing and maintenance engineers themselves, there's a danger that equipment will be badly installed, leading to downtime and system failures.

Three big trends

So how are these trends already impacting fire alarm testing and maintenance? Let's look at each in turn:

■ Integration:

Products are already available that centralise information from every different make or brand detection and alarm system, even if they are in different buildings or reaching to different towns or cities. This enables service and maintenance organisations, facilities and estates managers and end user organisations to view the overall status of their entire estate or even their global portfolio via a user-friendly user interface.

■ Mobile and the cloud:

Connected technology allows users to access data showing activations and system faults from any internet-enabled device including laptops, desktops, tablets and smartphones. This enhances system management, speeds up the repair of system faults and reduces maintenance costs. This allows faults to be dealt with immediately and for an engineer to know the parts and equipment to take to the call to ensure the problem is fixed first time. Automatically-generated notifications sent by email can also reduce the time taken to respond.



Image courtesy of Drax Technology

■ Big data and data analysis:

These systems already produce reports based on weekly testing, service visits and live activity. These reports can then be exported or customised and saved in different formats to show customers the status of the system, to measure engineer and system performance and to give evidence of compliance.

The web portal is generally controlled by the business maintaining the system. It will be up to them how much information their customers receive as part of the service or how much access they have to the dashboard and associated data. Providing access to this information could, if appropriate, be used to generate additional revenue for the service and maintenance company.

Invest in training

But, how can fire system testing and maintenance engineers ensure they are up to speed? Systems vendors often provide training, but although this is generally of a high standard, it only goes so far. Those who wish to grab new opportunities wholeheartedly should consider investing

▲ IT skills acquired now won't go to waste as the trend is only moving in the one direction.

in a more generic course to give them a broader picture. For example in the UK both City & Guilds and the British Computer Society run a wide range of courses for all levels. Alternatively all the main IT vendors run globally-recognised certification schemes such as MSCE, CCNA or any other recognised course with a focus on IP networking.

There are also cultural and communications lessons to be learnt. Often traditional engineers and IT teams speak a different language, leading to a lack of understanding and a crisis of confidence. It might be just a case of learning different terms to avoid confusion.

However, one thing is certain. IT skills acquired now won't go to waste as the trend is only moving in the one direction. Plus, those that are skilled and qualified can command higher fees and can look forward to a more rewarding future.

➔ For more information, go to www.draxtechnology.com



Image courtesy of Drax Technology

Keith Minster is Product Manager of Drax Technology.



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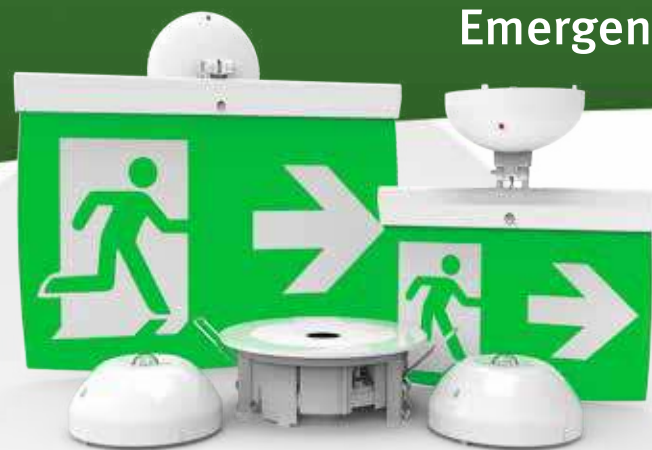
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Proactively stopping fire with foam

A fire in a building can be tragic. Even without lives lost, victims may still suffer lost property and sense of security. Also, there is the financial burden and inconvenience that a fire can cause. Protecting from loss critical, which is why the passive fire protection industry is continually working tirelessly to make fast, easy and accessible firestopping solutions.



Paul Fannin

With this constant drive for faster and easier to install fire prevention methods, it's important to ensure that solutions will not sacrifice the protection provided by a properly installed fire rated system.

As the construction industry evolves and applications grow in size and complexity, firestopping solutions must simultaneously transform to accommodate new trends while still effectively guarding against fire damage – always with an eye toward minimizing construction challenges.

Offering such solutions to contractors ensures that fire protection will remain a priority in future construction.

▼ When an opening is created in a fire-rated wall, door or floor-ceiling assembly, a “through-penetration” application is required.

Proactive fire prevention

In addition to building a strong, functional framework for a structure, a critical part of a contractor's job is to follow the applicable building code and make sure buildings are properly and proactively constructed to withstand a typical fire.

Firestopping solutions are an integral part of a balanced, well-designed fire protection system. Just as it is critical to have firefighting technology that will effectively put out flames and smoke from an existing fire, it is equally important to have effective firestopping technology that will contain a fire, preventing further damage to the rest of the building.

New construction methods call for updated firestopping solutions, which is why companies like 3M continue to improve on established solutions to keep life safety as the primary motivation for innovation.

Paul Fannin received his B.S. in Chemical Engineering from University of MN – Twin Cities. He has worked in various roles at 3M, including a technical aide in the Corporate Research Lab, a laboratory technician in the Adhesive Sealants Lab of the Industrial Adhesives and Tapes Division, and has been a Technical Service Engineer in Fire Protection Products since December of 2014.



Foam firestopping technology

Pre-formed blocks and plugs, as well as other forms including pillows, composite sheets or boards have been used in the fire protection industry for years. These items offer quick, simple solutions for firestopping, especially for construction where large utility openings exist.

Traditionally, most firestop block products require additional support, such as a wire mesh, to stay firmly in place in a fire scenario.

3M's foam block products do not require this additional support from wire mesh or any other support method. 3M has specifically formulated and tested the products to ensure they were able to withstand the ASTM E814 fire and hose stream test without the need of wire mesh or other support.

Wire mesh installation is inconvenient for a number of reasons, including the supply of additional material as well as the required installation tools. Wire mesh installation is an added step in a firestop installation, which increases the time and labor costs associated with completing the job. Eliminating the need for wire mesh and other additional supports saves time and money.

The foam application maintains the integrity of the wall, while still providing a tight seal to protect the infrastructure. Foam can also be easily cut with simple tools to fit any needed size. This makes foam products a simple and cost-effective solution for both small and large complex openings in floor or wall through-penetrations.

Properly firestopping "through-penetration" applications is required whenever an opening is created in a fire-rated wall, floor, or floor-ceiling assembly. The opening is typically designed to allow for piping, cables, cable trays or ductwork to pass through. Since all buildings are designed differently, foam blocks, planks and plugs can be a versatile solution that can accommodate varying designs.

Foam products offer flexibility and easy re-entry, which can be a time saver when it comes to retrofit installations that might require recabling or other extensive re-work. The flexibility and re-entry aspects also make foam an excellent and efficient solution for firestopping large and complex through-penetration applications.



▼ 3M's Fire Barrier Blocks, Planks and Plugs maintain a tight barrier against fire, smoke and noxious gases.

Foam versus the alternatives

Alternative firestopping solutions might vary depending on the size of the opening. Pillows, composite sheets or mortar would be ideal for medium to large openings, and sealants or caulks would be more geared toward small openings.

Foam blocks can offer a tighter seal against air leakage than pillows, which is important when an L-rating is required. Foam blocks are also easy to resize by simply cutting to fit, whereas pillows need to be cut and then taped over or resealed before installation.

Since the foam can be cut to fit a broad spectrum of different opening sizes in fire rated construction, contractors can standardize the type of material they use across all openings. This eliminates the need to purchase different materials to accommodate different opening sizes. The foam blocks are easy to cut with a simple serrated knife, and once cut to size are immediately ready for installation. It's as simple as stack, seal, and done.

Composite sheets or mortar are both effective firestop solutions but they also pose their own set of problems. In some cases where penetrants need to be removed from or added to a through penetration that is firestopped with composite sheets or mortar, the product would need to be completely removed and reinstalled.

With foam blocks and planks, the individual blocks can be removed and replaced as needed, or cut out from the assembly with a knife. Some caulks and sealants can become very hard when they cure or dry, which makes removal for retrofitting more of a challenge.

Firestop solutions that take a lot of time to install, such as composite sheet, will cost more due in part to the additional labor. This is because composites are

faced with sheet metal, which requires a skilled sheet metal cutter to precisely fit it around penetrants properly in a through penetration scenario.

The easy sizing and installation of foam products often make them a more effective and efficient choice for contractors who want to reduce labor costs and time spent on installation, but still want to ensure they are doing their due diligence in ensuring the building is protected against fire.

The potential for a laborer to cut corners and try to complete work faster allows for the possibility of mistakes during installation. A simpler solution that doesn't require as much precision will help to eliminate those errors.

Filling an opening, however, does not guarantee that product will provide the required protection. When selecting a firestop method, it's crucial to ensure that the product manufacturer has thoroughly tested the product. It is a best practice to research the products and manufacturers to make sure the products are proven to be effective in a fire scenario, and qualify for the full rating of a fire-rated assembly.

Protecting lives

Building fires can be devastating tragedies causing damage and even fatalities in certain cases. No matter what type of structure you are building or renovating, an integrated fire safety approach with updated and effective firestopping technology is required.

Foam preventative firestopping products are flexible for all opening sizes, making them an efficient and cost effective way to stop the damaging effects of fire and smoke before they can even start.

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Fire prevention in a high-bay freezer warehouse

The OxyReduct® active fire prevention system enhances safety in the world's largest high-bay freezer warehouse. When it comes to fire prevention, Preferred Freezer Services focuses on risk minimization rather than loss adjustment.



Katharina Bengsch

Katharina Bengsch holds a degree in Social Sciences and has previously worked as a newspaper editor. Since 2013 she has worked as an editor at the WAGNER headquarter in Langenhagen, Germany.

The figures are impressive: three protected areas with a total volume of over 40M cubic feet, 98.4' shelving systems, 117,000 pallet storage spaces and an order volume of over US\$100 million. It stores and unloads around ±900,000 tons of frozen food per year, which make it the largest, automated, high-bay freezer warehouse in the world.

In the US, this colossus is also uncommon in its structure. Not only are high-rack storage facilities fairly rare in the US, those with deep-freeze capabilities are even rarer. Preferred Freezer Services consciously chose this design as the best and most efficient solution for their automated logistics

processes for storage and distribution. When it comes to fire prevention, however, warehouses of this size and capacity do present special challenges.

Action rather than reaction The active fire prevention system minimizes the risk of fire from the outset

The fire prevention system installed in the freezer facility is an OxyReduct® Pressure Swing Adsorption (PSA) system specially adapted to the site's structural conditions.

The system's principle is based on lowering the air's oxygen concentration in the warehouse through controlled introduction of nitrogen.

The right level of oxygen was determined on the basis of fire tests considering ignition thresholds of the stored goods packaged in dispatch-ready cartons as well as the negative

▼ The Preferred Freezer Services warehouse is the first building in the USA to be protected by OxyReduct® technology.





▲ Preferred Freezer Services' automated, high-bay freezer warehouse in Richland, WA, is the largest of its kind in the world.

temperatures (-10°F) in the warehouse. The results of fire tests were approved by the independent German authority VdS (Organization of Property Insurers).

Sprinkler system or firefighters – in the event of a fire, neither one can reach the source of the fire quickly enough

In the US, conventional sprinkler technology is still the norm. Very tall rack systems, however, quickly push sprinklers to their limits. In a high-rack storage facility with a height of ±100', there is no guarantee that the water intended to extinguish the fire will even reach the source of the fire. In densely packed warehouses, the extinguishing water can get 'lost' amid the racks before it can reach the fire. Even if fire is detected and the sprinkler system is triggered in a timely manner, there is a high probability that the extinguishing water will not effectively hit the source of the fire.

This was the conclusion drawn by the planning office commissioned to create a risk report that focused on the dimensions of this warehouse in relation to standard market solutions.

Constant air movement in a high-rack storage facility would cause the vertically released sprinkler water to swirl around as ice water. In this environment, firefighters' ability to counter a potential fire was determined to be virtually impossible. In a dark, ice-cold environment with

aisles approximately 482' long and shelves 115' high, this warehouse would push the firefighters to their physical and technical limits.

For Burnie Taylor (GM, Preferred Freezer Services Richland) sprinkler represented an unsatisfactory solution – especially as experience has shown that 50 to 70% of damage within a warehouse is caused as a result of burst water pipes on sprinkler systems or sprinkler heads that are loose or come off during operations.

"Our warehouse has to be operational 24/7. We can't afford interruptions of any kind," explained Burnie. "A fire would be a nightmare scenario – not only would it be a threat to Preferred Freezer as a

company, it would be a huge blow for the entire region."

In other words: the consequences for the operator, its employees and the entire region around Richland, would be catastrophic. It was this reason that WAGNER's OxyReduct® active fire prevention system was selected as the most logical fire protection solution.

➔ For more information, go to www.wagner-us.com

▼ The logistically efficient, clad-rack structures are not yet as common in the US as they are in Europe.



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The role of stone wool insulation in achieving passive fire protection

Due to its natural basalt rock and recycled slag composition, stone wool exhibits a number of unique and valuable characteristics, including its ability to resist fire, water and mold. With code changes, increased product knowledge and changes in building practices, the need for improved fire resistance in all buildings is gaining greater attention to improve the built environment and safeguard those who use and occupy structures around the world. Stone wool insulation, with its unique and beneficial properties, is moving to the forefront when it comes to insulating to achieve passive fire protection.



Jim Miller

Jim Miller is the North American Sales Manager for OEM / Roxul Inc. and has worked in the insulation industry for 14 years, with 12 years spent in residential, commercial, industrial, and sandwich wall panel insulation sales. Jim also spent 4 years performing comprehensive product testing and determining the best products for various applications. He is highly regarded for his industry knowledge and technical expertise.

The benefits of stone wool insulation are ideal for sandwich wall panel (SWP) applications given the fact that stone wool is non-combustible, inorganic, and will not contribute to harmful smoke or toxic gases in the event of a fire. In addition, stone wool provides superior thermal performance, while offering the added benefits of environmental sustainability, moisture resistance and excellent sound absorption. Stone wool is traditionally

▼ Stone wool insulation is fire resistant and doesn't contribute to the development of toxic smoke, harmful gases, or flame spread.

used in commercial and industrial buildings for interior walls, curtain walls, cavity walls and low slope roof applications. However, its use in one, two and three-hour, fire-rated SWPs and other OEM applications such as fire doors and partition walls, alike, are being further explored due to the increasing demand for improved fire resistance in buildings, stricter building codes and the rising trend towards environmentally sustainable building products. Enduring temperatures up to 2,150°F (1,177°C), stone wool is non-combustible and does not promote smoke or flame spread when exposed to flame.



Stone wool insulation fire properties

SWPs manufactured using combustible insulation materials result in a range of challenges. Most importantly, if the combustible core materials ignite, the metal sheeting on the surface usually screens this insulation from an active fire prevention system such as sprinklers or other extinguishing systems. As a result, a fire inside the panel can spread quickly. Furthermore, many combustible insulation materials could release toxic gases and particulate matter into the air during a fire. This could impact fleeing occupants, firefighters and the overall environment.

Materials do matter. Non-combustible materials in passive fire protection provide an extra measure of dependability. Stone wool insulation can contribute significantly to occupant comfort and safety, while providing efficiencies and savings for owners throughout the lifetime of a building. Stone wool is highly effective in fire stop applications, helping to achieve compartmentalization. Because of its high melting point, it potentially provides more escape time to occupants in the event of a fire. Additionally, that stone wool insulation material will not contribute to toxic smoke or fumes makes a serious case for its integration in passive fire protection systems. The statistics surrounding fire-related deaths are very clear – smoke, not burn-related injuries, is the primary cause of most fire-related deaths.

According to the U.S. National Fire Protection Association, smoke often incapacitates so quickly that people are overcome and can't make it to an otherwise accessible exit. As a fire grows inside a building, it will often consume most of the available oxygen, while toxic gases build. As stone wool insulation is certified non-combustible by CAN4-S114 standards, it will not develop toxic smoke or promote flame spread, even when directly exposed to fire, as most other insulation materials do. In fact, when tested in accordance with ASTM E 84 (UL723), stone wool results typically show a flame spread of 0 and a smoke development of 0 – among the lowest of all insulating materials. By comparison, various foam plastic insulations, when tested to ASTM



Image courtesy of OEM/Roxul Inc.

E 84, typically achieve a flame spread of 25 and smoke development in the 250 to 500 range. Stone wool insulation used in passive fire protection systems can help to save lives and protect the structural integrity of a building by reducing the chance of it collapsing due to flame spread, thereby minimizing damage. As such, it can help to create a safer environment for firefighters, reduce environmental damage, and help lessen restoration costs.

Why opt for a non-combustible core SWP?

With regards to SWPs specifically, the demand for stone wool, especially in North America, lags behind Europe. This is because the need for SWPs with a non-combustible core in Europe is different than it is around the

▲ SWPs can be up to 12 m in length and can be installed vertically or horizontally. For larger panels, a crane is sometimes used to lower them into position.

world. European demand accelerated significantly in the 1990s as a result of the number of fires in the United Kingdom (UK) that involved SWPs with combustible core insulation. Total fire losses in the UK food processing industry, where SWPs with combustible insulation were used, were more than \$38 million USD in 1995 alone. One dramatic example in France is the fire that occurred at the Bordeaux Meat Packing Plant. Fire within the combustible insulation in the SWPs spread at a remarkable rate of 2.1 metres per minute. Firefighters arrived on



◀ SWPs are made out of two outer metal sheets with a stabilizing core of insulation sandwiched between them.

the scene within 10 minutes after the first alarm. In that time, 6,000 square metres had already been destroyed.

As a direct response to this disaster and catastrophes of this nature, the European market established a series of regulations and test methods targeted at the design and use of SWPs. The fire test methods ranged from small, to intermediate, and large-scale tests. As a result, proper specifications and enhanced fire safety management procedures have significantly reduced the number of fires involving SWP products in Europe. Now, UK's insurance industry will only certify products that have been subject to large-scale fire tests where SWP products with non-combustible cores – such as stone wool insulation – are permitted.

In most parts of the world, non-combustible, fire-rated SWPs are part of a niche market – albeit a growing one. Because building owners are becoming more aware of the shattering effects fire can have on their livelihood and the environment, interest has been climbing for fire-rated, sustainable alternatives. The migration of European manufacturers familiar with stone wool SWP advantages is also creating demand as well as bolstering product knowledge in North America.

As changes in the industry and evolution of codes and standards continue to take place, the specifying community needs to respond so that passive fire protection solutions will continue to evolve for the better. The status quo mindset that automatically opts for traditional insulating materials, such as expanded polystyrene (EPS) and rigid polyurethane foam (PUR/PIR or polyisocyanurate), must continue to be challenged to consider alternatives that offer a safer solution. Stone wool insulation, with its inherent ability to

withstand extremely high temperatures, as well as its additional benefits of sound absorption, moisture resistance, dimensional stability, sustainability and long-term thermal performance, is proving to be an obvious choice for SWP insulation and other passive fire protection systems, such as fire doors, beam/structural systems and prefab tunnel protections.

Code requirements

When it comes to code compliance, the key benefit of using SWPs or other OEM applications with non-combustible cores can be summed up in one word: simplicity. All of the confusion, complexity and ambiguity can be easily eliminated by specifying with a non-combustible core such as stone wool. Depending on where and how the products are used, SWPs, specifically, have to meet numerous requirements. The requirements of various fire tests are determined by many factors. Building type, size and use, as well as distances to adjacent property lines and the percentage of unprotected openings in the exterior wall – such as non-fire-resistant windows and doors – are among the many considerations.

Canadian and U.S. codes (for example, the 2005 National Building Code of Canada and the 2009 International Building Code) contain specific requirements for SWP applications incorporating “foamed plastics”, though these requirements aren't always applicable to all SWP products, particularly those that do

not contain foam plastic cores. North American code requirements are separated into the following three groups, categorized by fire performance:

- 1 Flame spread, combustibility and interior fire growth
- 2 Exterior wall applications
- 3 Fire resistance rated assemblies

The types of materials used in SWPs and the purpose of the wall determine the rules of each code. SWPs with foam plastic cores have various additional restrictions related to building height, sprinkler protection, use of thermal barriers and distance between adjacent property lines. In contrast, SWP products with non-combustible cores, such as stone wool, are far less restricted and much less complicated to use from a building code perspective.

Growth potential

Stone wool offers a vast array of safety, comfort and efficiency benefits and has the ability to meet or exceed standards and rigorous testing requirements, as well as more advanced building codes. Based on this, it is expected that the use of stone wool insulation in passive fire protection systems – including SWPs – will gain increasing traction among specifiers, consultants and engineers charged with ensuring today's buildings are built stronger, safer, more efficiently and more sustainably than ever before.

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Designing for passive fire protection in buildings

It is hard to over-emphasize the importance of a passive fire protection (PFP) strategy and its subsequent governance in building design. Comprising some kind of an assessment of the likely fire risks, an evacuation plan, and the means to deal with both, the absence of a robust strategy has long been a problem, only now properly appreciated. Building Information Modelling offers good promise for enshrining it, auditing design changes, tracking liability, automatically detecting clashes and ill-advised changes, and generally communicating the strategy for the whole life of the building.



Ross Newman

The primary concern of PFP is for life safety. Radiant heat is rarely the problem, although it can of course be fatal. Much more dangerous are the products of combustion (e.g. smoke). National and international regulations, codes and standards concentrate on these and related threats, many of which are well understood and for which there are good solutions. The formal penalties for getting PFP wrong include criminal conviction.

However, human health and safety is by no means the only objective of PFP.

▼ Service pipes and cable systems correctly specified and fitted with suitable fire stopping products through a compartment wall, the work in this case carried out by a third party certified installation company.



Other interested parties all have their own reasons for going beyond life safety.

Owner-occupier clients will also want to protect their property and the assets therein to avoid interrupting their operations. To attract purchasers and tenants, developers will need to be able to give assurances about fire protection. Insurers will also want to eliminate or mitigate all fire risks. Investors will demand best practice as a matter of due diligence. And building users will, depending on their fire risk exposure, want as much built-in fire protection as possible to save themselves the cost and delay of adding active systems and upgrades.

Fires are dangerous per se, but they become catastrophic only when they spread from the room of origin. The point of PFP is to prevent this spread, or at least delay it. All too often, however,

fires do spread, often because of faults with the construction of otherwise perfectly robust PFP design.

The finger of blame for these disasters is commonly pointed at the contractors who installed the measures incorrectly or the inspectors who approved them. However, the designers should share some responsibility because the overarching PFP strategy was patently not properly communicated. While this once again highlights the importance of the PFP strategy, it also emphasizes the need to specify that competent contractors are appointed to build the designs.

This is especially true in the modern procurement context where primary designers rely on performance specifications, leaving the detail design to the main contractor. Since many aspects of PFP are hidden from view, retrospective fixes for poorly installed designs are disproportionately difficult and expensive. No wonder that projects are increasingly insisting on certified qualifications and accreditations from their specialist contractors.

PFP in buildings affects almost every aspect of the design. The objective is to restrict the fire to a fire and smoke-resistant compartment long enough to allow people to escape safely and for the emergency services to attend.

Best practice also aims to minimize other kinds of damage. Combustion will destroy the building fabric but again, the effects of smoke – even cold smoke – are much more damaging. Interestingly, the choice of extinguishant can be almost as damaging. For example, water will be sprayed widely during an emergency, compounding the fire or smoke damage and trickling downwards to otherwise unaffected areas. There is also a significant environmental risk from water getting contaminated and running off into watercourses.

The perfect fire-resistant construction would be made of non-combustible, heat-insulating materials and have no doors, windows, building services penetrations, voids or cavities. Of course, the needs of other critical systems mean that this is not possible, and so the designer must use technical work-arounds. Even then the system will only work with the compliance of the users and good management. For example, although a technically complex piece of equipment, a fire-resisting doorset will only work if kept shut.



Image courtesy of Exova

PFP should be proportionately balanced against active systems for an optimum cost-effective solution. The guiding principles are to:

- Communicate the PFP strategy to the whole project team;
- consider the impact of design changes on the overall PFP strategy;
- use fire-resistant building materials;
- reduce the chances of fire spreading by secondary ignition;
- design physical barriers to resist flame and insulate against heat;
- design the structure to resist collapse or excessive deflection in the event of fire;
- minimise the spread of smoke and other products of combustion in the event of fire;
- design features to safeguard against security breaches that threaten arson;
- minimize the risk that fire can spread in from an adjoining building or other external fire source;
- ensure that instructions for the use and management of fire protection systems are recorded and handed over to the client;
- facilitate access for fire-fighters;
- consider the risks from firefighting water and, if necessary, design to mitigate them;
- specify third-party certificated or otherwise quality assured fire protection products and services wherever possible;

▲ An intumescent seal in the process of being correctly fitted to the meeting edge of a double door leaf in accordance with the door suppliers instructions.

- insist on high standards of workmanship to minimize fire risks both in the completed building and during construction;
- double-check designs for clashes, errors or oversights before issue.

These principles need to be applied to the following elements of the building, each a specialist field by itself:

- **The structural frame:** steel frames are particularly vulnerable. Steel loses strength quickly under quite low heat loads and so must be protected in board materials, or sprayed with intumescent paints or cementitious applications. Timber frames are combustible; they are usually protected by plasterboard. Concrete frames generally do not need protecting, although spalling can be a problem, particularly if it exposes steel reinforcement.
- **The building envelope:** as well as preventing fires from spreading internally, it is desirable to stop them spread to neighbouring buildings and other assets too. There are many solutions, all of which of course must be thoughtfully designed.

Ross Newman,
Principal Technical
Officer, Exova BM TRADA.



Image courtesy of Exova

▲ **Incorrect use of a non-fire resistant gap filling foam product used around a number of cables passing through a fire resistant compartment line. The compartment line will likely be compromised much earlier than expected in this case.**

■ **Doors and shutters:** doors or shutters only need to be fire-rated if set in fire-rated walls, in which case their ratings must match in most circumstances. How they are intended to be used and by how many people will affect the choice of door-closer and other elements of door furniture. Correctly installed third-party certificated complete fire doorsets are the preferred route to peace of mind.

■ **Compartment walls, floors and ceilings:** compartment walls should run continuously to join the floor above to form an uninterrupted fire barrier, even through ceiling voids and roof spaces. Doors and glazing in them need equal fire-resistance in most circumstances. Any service holes through compartment walls should be kept as small as practicable and must be appropriately fire-stopped. The same is true for shafts running through floors or ceilings. And since

these are hidden from view, contractual responsibilities for getting them right must be clearly stated.

■ **Fire walls or fire-separating elements – especially to preserve the means of escape:** these are barriers that preserve escape routes and areas of especially high fire risk, such as cooking machines in food factories or fuel storage spaces. Doors, glazing and service penetrations need equal fire resistance in most circumstances.

■ **Floors generally:** resistance depends on the material they are made from. Timber chars and is consumed at a predictable rate. Superheated concrete is prone to explosive spalling, which might expose steel reinforcement. Steel deforms and weakens catastrophically when exposed to heat. Proprietary fire protection products must be selected with care to suit the particular on-site conditions.

■ **Cavities:** ceiling or wall cavities are protected from flames and smoke with barriers. Because they are hidden from view in the finished building, they must be designed and installed correctly, making it particularly important to clarify responsibilities in the contractual arrangements.

■ **Air distribution systems and ductwork:** often left in the hands of a specialist sub-contractor, fire protection in the air distribution system needs careful attention. Methods include installing fire dampers where it passes through the compartment wall or floor, using fire-resisting ducts or enclosing the systems in fire-resisting shafts.

■ **Service ducts and shafts:** ducts and shafts containing fuel lines and other building services can obviously help to spread fire and smoke and must be adequately fire-stopped wherever they penetrate compartments and other fire barriers.

■ **Pipe, cable and other services:** where these penetrate fire barriers, they must be appropriately fire-stopped. The exact method will depend on what is penetrating the barrier and how the barrier is fire-rated. Large penetrations have the added problem of potentially weakening the structure, and so any seals will have to be capable of reinstating the structural integrity of the fabric as well as stopping any fire.

■ **Glazing systems:** glazing in fire barriers such as compartment walls or ceilings must match their fire-rating. There are many products that maintain their integrity. Specifiers are increasingly selecting glazing that insulates against radiant heat as well, which is important along escape routes. Note that their frame and method of fixing is critical.

PFP is best thought of as a critical system rather than a mere technical solution. Its disparate parts function as a whole and cannot simply be installed in isolation from each other or the many other critical systems that govern the design of buildings.

From drawing board to final handover and beyond, the specification of the different elements involved has a habit of changing as responsibility passes from one consultant to the next and so on to the end user. Without an overarching PFP strategy and first class communication down this chain, a fire protection system is prone to be corrupted as small changes have unintended large impacts on its overall effectiveness.

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BRE Fire Research Conference highlights

Research shaping the future of fire safety design and management was outlined to a packed auditorium at the second annual BRE Fire Research Conference which took place recently (June 2016).

Experts discussed newly published and current BRE research related to both passive and active fire protection, ranging from roof void compartmentation and fire safety in open plan flats, to sprinkler systems in housing and the problem of false fire alarms.

More than 150 delegates from across the UK and overseas, including the Middle-East, attended the day event held at BRE's headquarters and science park in Garston, near Watford.

Reflecting BRE's standing in the field of fire behaviour research and fire performance testing, the diverse programme of ten speakers attracted a wide range of stakeholders. Among attendees were architects, engineers, building control officers, local authorities,

housing associations, manufacturers, fire safety consultants, and representatives from the NHS, fire services, academia and insurance industry.

This year's keynote lecture was given by Professor Colin Bailey, Deputy President and Deputy Vice-Chancellor of the University of Manchester and an international authority in structural fire engineering. As well as writing a series of seminal fire design guides, he was lead expert in reviewing the structural fire design of London landmarks The Shard, The Pinnacle and Heron Tower, among others.

Professor Bailey discussed the legacy of large-scale fire testing at BRE Cardington which yielded critical data on structural fire behaviour that continues to inform safer, more robust and more cost effective design solutions.

Together with real fire data and the development of codified performance-based approaches, the work has delivered tools to better predict

a building's performance during a fire and more accurately assess risks.

Professor Bailey argued that performance-based design employing advanced models can better respond as we push the limits of structural engineering with the use of longer, thinner sections and new materials. A prescriptive approach dictated by building standards and system fire testing is less adaptable to the impacts of new technology and materials.

Referring to fire data on multi-storey structures, he explained that while any visible degree of vertical displacement in the beams will typically necessitate replacement, it does not lead to building collapse – a point that has been acknowledged by insurers. Hence, performance gains do not necessarily follow from an increase in beam fire protection, with evidence showing that between 40-55% of beams in multi-storey steel structures can be left unprotected. A performance-based approach therefore provides the confidence to target fire protection where it is required.

Landmark research

The remaining nine papers, presented by experts from across BRE's certification, structural and fire safety teams, gave an insight into other landmark research and opinion-leading projects.

Tom Lennon outlined DCLG commissioned research and experimentation into the fire resistance and fire safety of compartmentation in roof voids. It forms Workstream 3 of a number of linked projects to review the efficacy of fire safety provisions in Part B of the Building Regulations.

Findings confirm that, when applied correctly, current guidance on roof void compartments, cavity barriers and fire-related dampeners does achieve

► A group of delegates view a live fire demonstration in BRE's Burn Hall, one of Europe's largest facilities for assessing systems fire performance and fire suppression.

requisite performance. But a number of issues compromising compliance have been highlighted. These include lack of inspection during installation and poor workmanship, notably gaps being left in compartmentation due to gaps around the cavity barriers, as well as site techniques affecting the assumed level of compression of the barrier. DCLG guidance regarding compartmentation in roof voids is expected in the near future.

Dr Corinne Williams reported on a current project for the Welsh Government to monitor the success of residential sprinkler installations at a number of pilot schemes. Sprinklers became mandatory for new and converted houses and flats in Wales on 1 January 2016. Involving feedback from residents, builders, water companies and other stakeholders, the study covers 177 dwellings at 12 different locations, comprising social housing and one private housing development.

Initial observations highlight the need for early planning of installation to avoid costly rework. For example, cut-outs need to be correctly sized for sprinkler pipework. Care is needed in locating pump control equipment, especially in kitchens, to minimise inconvenience to occupier lifestyle. Water supply – whether it should be mains fed, or from a dedicated or boosted supply – should also be considered early to ensure adequate pressure to the sprinkler system.

Costing Britain around £1 billion a year, Raman Chagger talked about BRE research into the significant problem of false fire alarms on commercial premises. Statistics on call-outs attended by the fire services during 2013/2014 across Great Britain show that 58% (293,000) were false alarms. Building on previous BRE Trust work in this area, a six-month programme of live investigation of false alarms was undertaken by BRE in conjunction with the Scottish Fire and Rescue Service and a specialist fire alarm investigator.

Detailed analysis of 65 false alarms indicated that 20% resulted from testing, underlining the need to take systems offline for this activity. Manual call points



accounted for 16.7%, indicating a need for greater use of protective covers. The project has led to 35 recommendations for reducing false alarms. These were discussed at a stakeholder workshop in February to see how they can be taken forward by the industry. Research by King's College London suggests that the use of multi-sensor detectors could significantly reduce false alarms. BRE together with partners is currently working on a standard test method for assessing multi-sensor detectors with optical and heat functions.

Steve Manchester discussed BRE's expert appraisal of the benefits and

limitations of wireless fire detection for prisons. BRE has previously assessed wireless technology for Sodexo Justice Systems. Traditional wired point detection is typically installed in cell ventilation ducts to prevent tampering. Capable of supporting up to 250 sensors from one control panel, wireless systems are much quicker and less disruptive to install.

▼ Dr Debbie Smith, BRE Global Managing Director.





Image courtesy of BRE

▲ Professor Colin Bailey from the University of Manchester.

This is a huge advantage in overcoming access in the tightly controlled space of the prison environment. However, signal blockages, 'dead spots' and interference from other radio sources are among the drawbacks.

Nigel Firkins outlined how BRE's latest Loss Prevention Standards are setting the benchmark in performance for local area fire suppression systems. They include LPS 1223 for Catering Equipment Suppression Systems, and LPS 1655 for Personal Protection Water Mist Systems which addresses the greater risk from fire of vulnerable people, often living alone. Also new is LPS 1656 for Condensed Aerosol Extinguishing Generators. Allied to this, BRE is currently developing an LPS for Direct Local Application in Small Enclosures.

A common feature of all four standards is that they are geared to a limited amount of fire suppression agent being discharged close to the seat of the fire and at an early stage of fire development. This early detection/annunciation/actuation principle uses relatively small quantities of extinguishant in the most effective and cost-beneficial way, advancing fire protection and the sustainability of technology at the same time.

Dr David Crowder highlighted BRE's

work with real fire incident data from the past 12 months signposting future developments and trends in fire protection and fire risk strategies. This has included experiments on fire spread via spandrel panels to assess the potential need for changes to regulations. Other research has focused on the growing incident of fire development through soffits. Experiments on aluminium, plywood and uPVC soffits have shown they do not promote lateral spread, so work continues to identify the contributing factors.

Worryingly, yet consistent with the findings of the compartmentation in roof voids project and by no means a new phenomenon, he warned that workmanship is the biggest problem affecting fire safety at the moment. He said that there is a pressing need for non-fire trades to understand the aspects of their site work that can compromise fire protection in buildings.

Dr Chris Salter highlighted fire safety considerations for open-plan flats, as the modern trend for ever larger open living space outgrows the parameters of current UK guidance. Previous work by BRE for NHBC determined various flat layouts considered to offer a level of fire safety equivalent to an ADB compliant layout. The use of fire engineering and modelling still offers robust scope to demonstrate how open plan flats can comply with regulations.

Martin Shipp discussed the importance of fire risk assessment

under current fire regulations governing non-domestic premises. The Fire Safety Order places a legal duty to safeguard people from fire risks on the 'responsible person' who may have little experience in this discipline. Mr Shipp underlined the need to seek professional support in ensuring that fire protection measures and management systems are based on competent fire risk assessment.

BRE's expertise in managing industrial hazards was the subject of the concluding presentation by Rob Lucas. While modern health and safety is vastly improved, the potential for catastrophic incidents remains. Mr Lucas cited the 2008 sugar dust explosion at Imperial Sugar Refinery (USA) which claimed 14 lives and injured 38, and the Buncefield oil storage explosion in 2005, Britain's most costly industrial disaster.

He outlined BRE's leading profile in the field of DSEAR (Dangerous Substances and Explosive Atmospheres Regulations) assessments for process, manufacturing and food industries as well as biomass and energy. This involves screening hazardous areas in relation to ignition risks and advising on improved safety, mitigation procedures and designing out hazards.

Strong demand and a positive reception from all sectors for the conference, which launched last year, is set to make it a firm fixture of BRE's annual events and CPD programme.

BRE Global managing director, Debbie Smith, who hosted proceedings, said: "We are delighted at the number of attendees and enthusiastic feedback. It reflects the diversity and influence of BRE's fire research activities, working with government and major stakeholders on pressing areas for investigation and improvement in fire protection and fire risk management."

Afterwards, a number of visitors took the opportunity to observe a live fire test in BRE's Burn Hall, one of Europe's largest dedicated research and test facilities for fire performance and fire suppression. Many also toured BRE's world class Innovation Park which is at the forefront of cutting edge thinking in eco- and sustainable building materials and methods.



For more information, go to www.bre.co.uk/frcpresentations



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Membrane penetration firestop systems

What are membrane penetration firestop systems and how has the penetration firestop standard evolved to evaluate them? Recently, the ANSI/UL 1479 Standards Technical Panel (STP) drafted and adopted changes to the fire test standard ANSI/UL 1479, Fire Tests of Penetration Firestops, which add test criteria to evaluate various types of membrane-penetration firestop systems within vertical assemblies to the existing test criteria for through-penetration firestop systems.



Luke Woods

Luke C. Woods, UL LLC
Principal Engineer – Fire
Resistance and Containment
Building & Life Safety
Technologies.

The changes include a new section for definitions relating to the various types of membrane-penetrations, a description of the test setup for membrane-penetrations, and the conditions of acceptance for membrane-penetrations. The scope of ANSI/UL 1479 is to evaluate firestop systems that are installed to maintain the fire performance of a fire-resistance-rated assembly when the assembly is breached by a penetrating item. For example, when a firestop system protecting a plumbing pipe penetrates the gypsum membrane on one side of a fire-resistance-rated gypsum wall, this revised standard would be used to evaluate that firestop system. These changes to ANSI/UL 1479 are significant, since, until this point, the standard only provided test criteria for evaluating through-penetration firestop systems.

You may be asking yourself “What is a membrane-penetration firestop system?” or even “What is a penetration or through-penetration firestop system?” Here are the terms, as defined in the 2015 International Building Code (IBC):

1. Penetration Firestop System

A through-penetration firestop or a membrane-penetration firestop.

2. Membrane-Penetration Firestop System

An assemblage consisting of a fire-resistance-rated floor-ceiling, roof-ceiling or wall assembly, one or more penetrating items installed into or passing through the breach in one side of the assembly and the materials or devices, or both, installed to resist the spread of fire into the assembly for a prescribed period of time.

3. Through-Penetration Firestop System

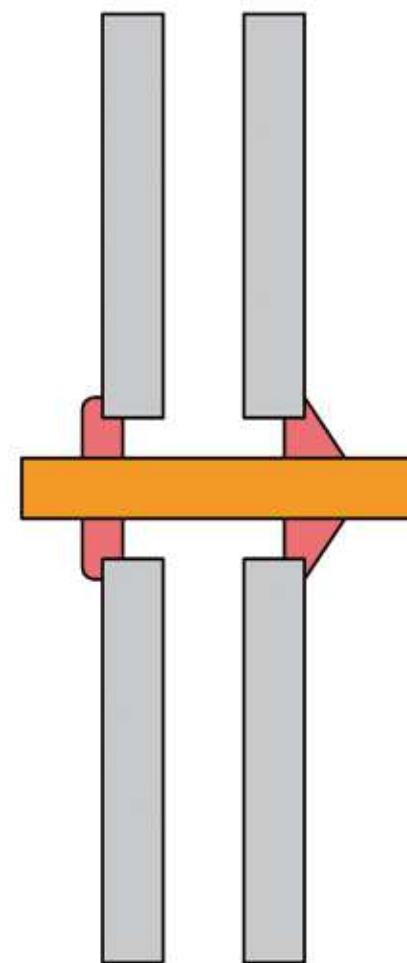
An assemblage consisting of a fire-resistance-rated floor, floor-ceiling or wall assembly, one or more penetrating items passing through the breaches in both sides of the assembly and the materials or devices, or both, installed to resist the spread of fire through the assembly for a prescribed period of time.

The building code goes on to require penetration firestop systems, both through and membrane type, to be tested in accordance with ANSI/UL 1479 (ASTM E814) to ensure the opening created by the penetration will not reduce the fire rating of the assembly breached. The various types of membrane-penetrations identified in the building code are box type penetrations (outlet boxes, gang boxes, hose cabinets, etc.) and utility penetrations (pipes, ducts, cables, etc.).

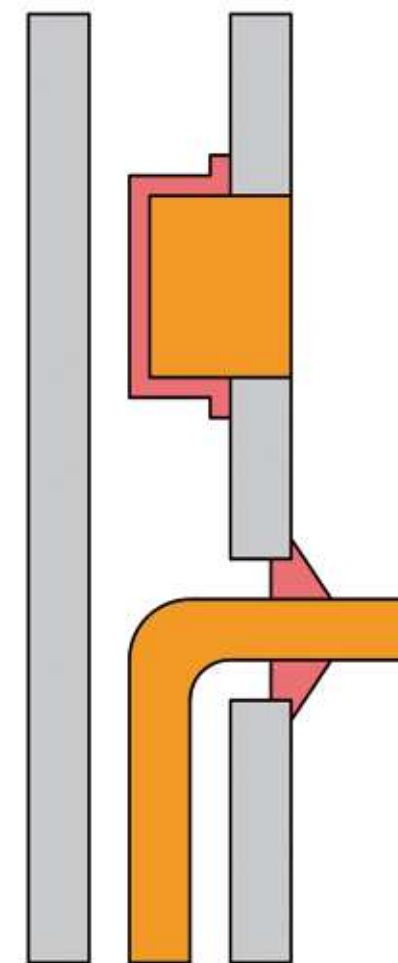
Let’s remember that fire-rated vertical and horizontal assemblies (walls and floors/floor-ceilings, respectively) must also meet building code criteria, which include testing in accordance with ANSI/UL 263 (ASTM E119). These assemblies must demonstrate ability to withstand the propagation of fire and hot gases (limit the average temperature rise measured at multiple points on the unexposed side of the assembly to 250° Fahrenheit and limit a single point on the unexposed side of the firestop assembly to 325° Fahrenheit), maintain load bearing capabilities (nonbearing assemblies are exempt from the load criteria),

Image courtesy of <http://www.aechto.com/images/materials/thermal-through-membrane-penetrations.png>

Through Penetration



Membrane Penetration



and withstand a hose stream impact (for vertical assemblies only). Therefore, the firestop systems protecting penetrations within these assemblies need to maintain a similar level of performance. Failure of the firestop system to maintain a similar level of performance may compromise the fire rating of the assembly.

Unlike a through-penetration firestop system that penetrates entirely through the fire-resistance rated assembly, and as such can be seen from either side of the assembly, a membrane penetration firestop system may not be seen from the non-breached side of the assembly. For this condition, ANSI/UL 1479 requires membrane-penetration firestop systems to have a T rating equal to the F rating of the assembly. The International Building Code, Section 714.3.2,

Exception 4 requires membrane-penetrations of wall assemblies by boxes other than electrical boxes (such as dryer boxes) to have an F and T rating not less than the required fire-resistance rating of the wall penetrated. The collective intent here is to maintain a similar level of performance between the wall with a penetration and the wall without a penetration. For reference, the definition of F and T ratings are as follows:

F Rating

A penetration firestop shall remain in the opening during the fire test and hose stream test and shall comply with the following:

- a) The sample shall withstand the fire test for the rating period without

permitting the passage of flame through openings, or the occurrence of flaming on any element of the unexposed side of the sample.

- b) During the hose stream test, the sample shall not develop any openings that would permit a projection of water from the hose stream beyond the unexposed side.

T Rating

A penetration firestop shall remain in the opening during the fire test and hose stream test and shall comply with the following:

- a) The transmission of heat through the sample during the rating period shall not raise the temperature measured by any thermocouple on

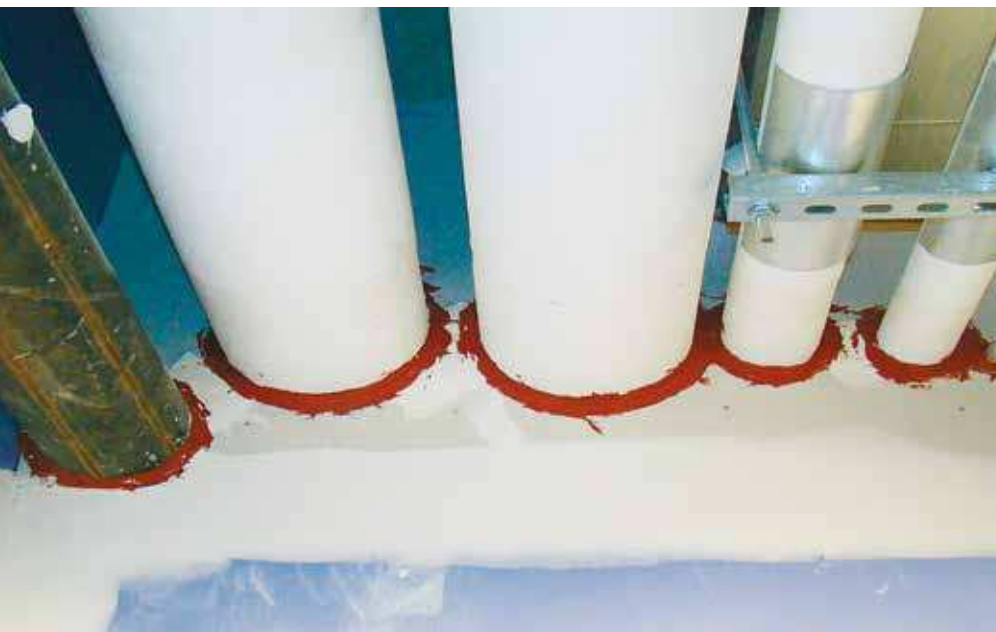


Image courtesy of UL

◀ 'Through Penetration' fire-stopping in a fire rated wall.

the unexposed surface of the firestop or on any penetrating item by more than 325°F (180°C) above its initial temperature. Also, the sample shall withstand the fire test during the rating period without permitting the passage of flame through openings, or the occurrence of flaming on any element of the unexposed side of the sample. For wall opening protective materials used with electrical and non-electrical box membrane penetrations, the T rating shall be equal to the F rating.

b) During the hose stream test, the sample shall not develop any opening that would permit a projection of water from the stream beyond the unexposed side.

But there is more work ahead for this STP and industry. While the test criteria for membrane-penetration firestop systems has recently been added to ANSI/UL 1479, the test method only provides guidance for such penetrations in a vertical fire resistance rated assembly. The STP that maintains and advances this standard must now work on providing guidance for horizontal rated assemblies. This group must consider what type of penetration firestop system challenges are presented, and how the test standard can help to rectify these challenges with focused test criteria such that field conditions can be considered safe as they have been evaluated by way of fire testing. This effort is already on going and will be the primary focus for this standard.

These membrane-penetration firestop systems can be found in the UL Fire Resistance Directory or online using UL Product Spec™ (<http://www.ul.com/productspec>) under the UL category XHEZ. If you have a desire to offer input or technical expertise, please consider participating as a formal member of the UL 1479 STP.

➔ For more information, go to www.ul.com/code-authorities/resources/technical-library

UL Product Spec™

UL Product Spec™ is a powerful new online search tool that provides easy access to thousands of UL Certified products, designs, systems and assemblies. This next generation search engine covers a wide range of construction materials, equipment, fire-resistance-rated assemblies, and firestop systems. It includes the flexibility to search by product name, master format number, related installation code section, keywords and other terms, and by required parameters for fire resistance designs and firestop systems.

To learn more about searching for firestop systems using UL Product Spec™, go to our online Technical Library page (<http://ul.com/code-authorities/resources/technical-library/>), and click on the article relating to locating firestop systems. Figure 1 shows an example of how UL Product Spec™ can be used to search for firestop systems based on required parameters.

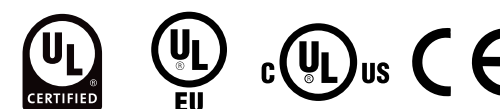
▼ An example of how UL Product Spec™ can be used to search for firestop systems based on required parameters.

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The new standard of care for structural fire protection

The frequency of uncontrolled fire exposure in engineered buildings is low due primarily to the effectiveness of fire sprinkler systems. However, certain events and/or circumstances may result in uncontrolled fire exposure that may affect a building's structural system. During such extraordinary events, heating of structural systems from fire exposure causes thermal load effects that are not contemplated in conventional structural engineering design, such as reduced material strength and loads induced by restrained thermal expansion. Under these conditions, it is critical that structural systems remain stable to protect occupant life safety, and perhaps satisfy other performance objectives.



Kevin J. LaMalva

Kevin J. LaMalva, P.E. is registered as both a fire protection engineer and civil engineer, and has worked at Simpson Gumpertz & Heger, Inc. since 2007. He is Chair of the ASCE/SEI Fire Protection Committee, Expert Panel Member for NIST's full-scale structural fire testing program, and Past President of the SFPE New England Chapter. He is also a member of the ASCE/SEI Structural Design for Fire Conditions Standards Committee, the SFPE Standards Making Committee on Fire Exposures to Structures, and the SFPE Standards Making Committee on Predicting the Thermal Performance of Fire Resistive Assemblies. He is the recipient of the 2007 SFPE Student Scholar Award and the Worcester Polytechnic Institute Stephen Salisbury Prize in 2006.

Two Design Philosophies

In structural engineering, the fundamental philosophy used to design structures can be simply expressed as: Capacity > Demand. The demand refers to loads that are imposed on a structural system including its self-weight. The capacity refers to the global and local ability of a structural system to carry the imposed demand. The design of a structural system evaluates the demand and capacity with respect to specific performance objectives including strength, stability, and stiffness.

Standard fire resistance design follows the long-standing provisions in building codes for structural fire protection. This approach primarily involves the selection of qualified assemblies from available listings to meet prescribed levels of fire resistance, and often does not require substantial engineering participation. Standard fire testing serves as the basis of standard fire resistance design. However, this testing does not include member connections, structural system response, or natural fire exposure. Consequently, this approach does not necessarily credit nor discount the level of fire resistance based on the capacity of the structural system itself to endure fire effects, nor does it properly evaluate all aspects of the demand (e.g., thermally-induced forces). Also, the consideration of demand due to heating is not with respect to specific performance objectives, but rather

superficial failure criteria enforced during standard fire testing.

As an alternative approach, structural fire engineering explicitly evaluates the demand and capacity of structural systems under fire loading in a similar manner as other design loads are treated in structural engineering practice. Within this framework, the demand on a structural system under fire loading can be reduced by means of rationally-allocated structural insulation, control of fuel loads, and/or other fire exposure mitigation techniques. Also, the capacity of a structural system to endure fire effects can be increased by means of specific member sizing, connection detailing, and/or other measures to enhance structural robustness with respect to explicit performance objectives.

New Industry Standard

ASCE/SEI 7 (Minimum Design Loads and Associated Criteria for Buildings and Other Structures) serves as the parent standard for structural engineering in U.S. building codes. This standard is published on a six-year revision cycle and was last released in 2010. The next edition of ASCE/SEI 7 is scheduled to be released at the end of 2016, and will commence a new industry-consensus standard of care for structural fire protection.

Per the upcoming edition of ASCE/SEI 7, the default option is for the

Written by Fire Professionals for Fire Professionals

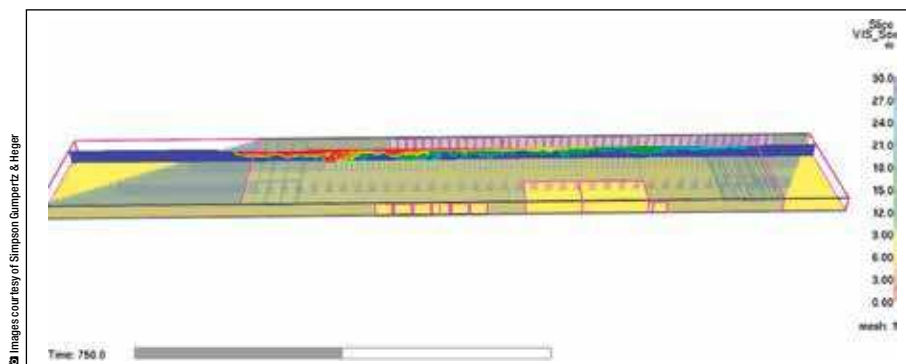
designer to strictly adhere to the requirements and restrictions of standard fire resistance design without exception. As mentioned, this approach is based on an empirical indexing system that excludes consideration of realistic thermal demands and structural system response. As an alternative, the designer may adopt a structural fire engineering approach as constituted in the new ASCE/SEI 7 Appendix E (Performance-Based Design Procedures for Fire Effects on Structures). Notably, the prospective inclusion of Appendix E in ASCE/SEI 7 will mark the first time that fire effects are considered as an explicit design load in a U.S. structural engineering standard.

New Appendix

ASCE/SEI 7 Appendix E provides requirements for structural fire engineering design, and does not pertain to and should not be used for standard fire resistance design. The appendix is also limited to analysis of structural systems that are not significantly damaged by other hazard events, such as an earthquake or an explosive blast. Although comparatively less comprehensive at the current time, Appendix E will provide a level of guidance for fire effects that is modeled after well-established seismic provisions in ASCE/SEI 7.

Appendix E is organized into six primary sections with associated commentary sections. Section E.1 to E.3 presents introductory material on scope, definitions, and general requirements. Section E.4 specifies mandatory (occupant life safety) and discretionary (e.g., building resiliency) performance objectives. Section E.5 presents analysis methods for determination of thermal response of structures to fire exposure with reference to applicable standards from the SFPE and NFPA. Section E.6 presents methods for determining the response of structural systems to thermal load effects from fire exposure, including development of temperature histories for structural components; material properties at elevated temperatures; and structural analysis techniques.

► Thermal Analysis of a Girder-Column Connection.



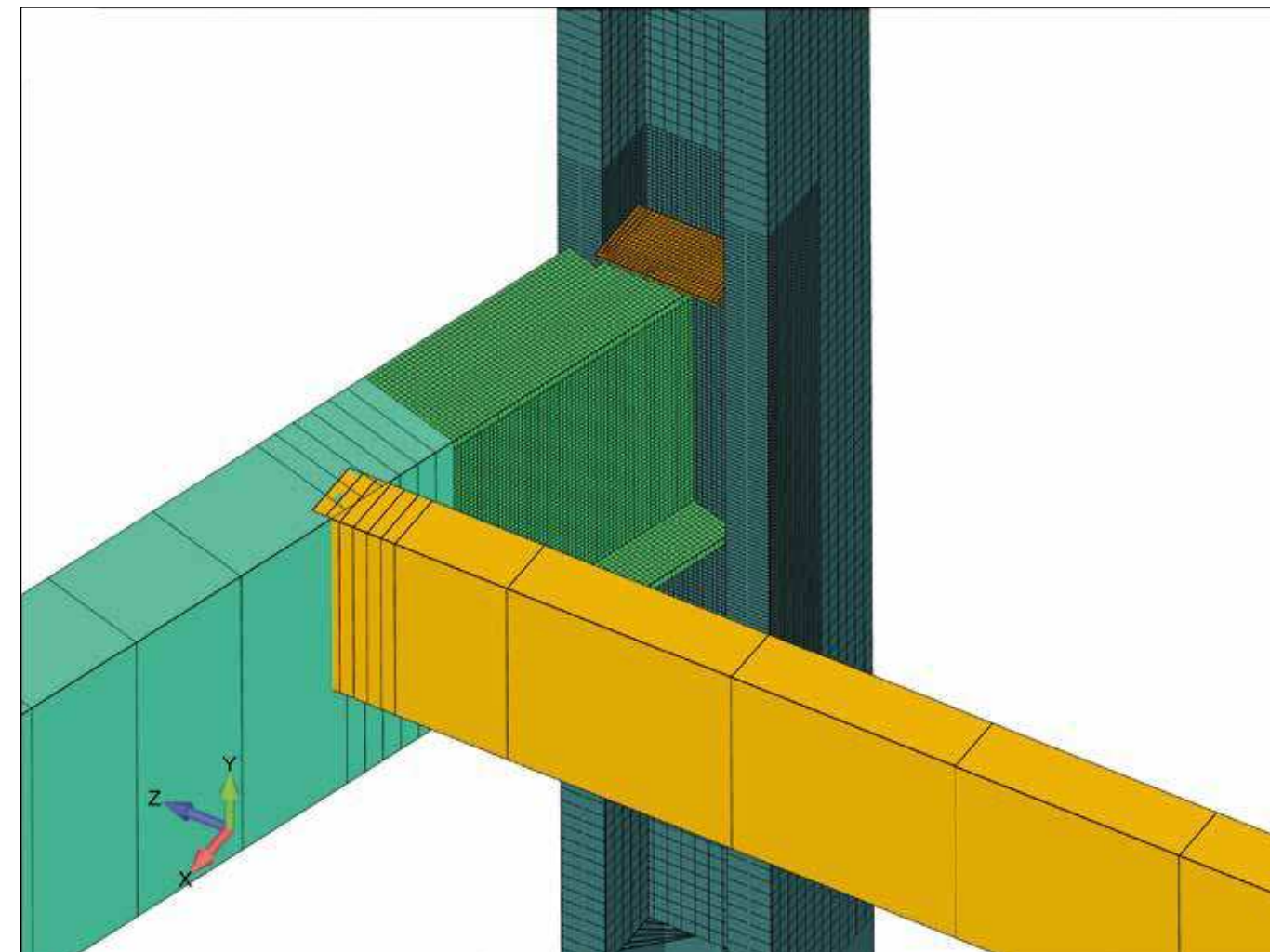
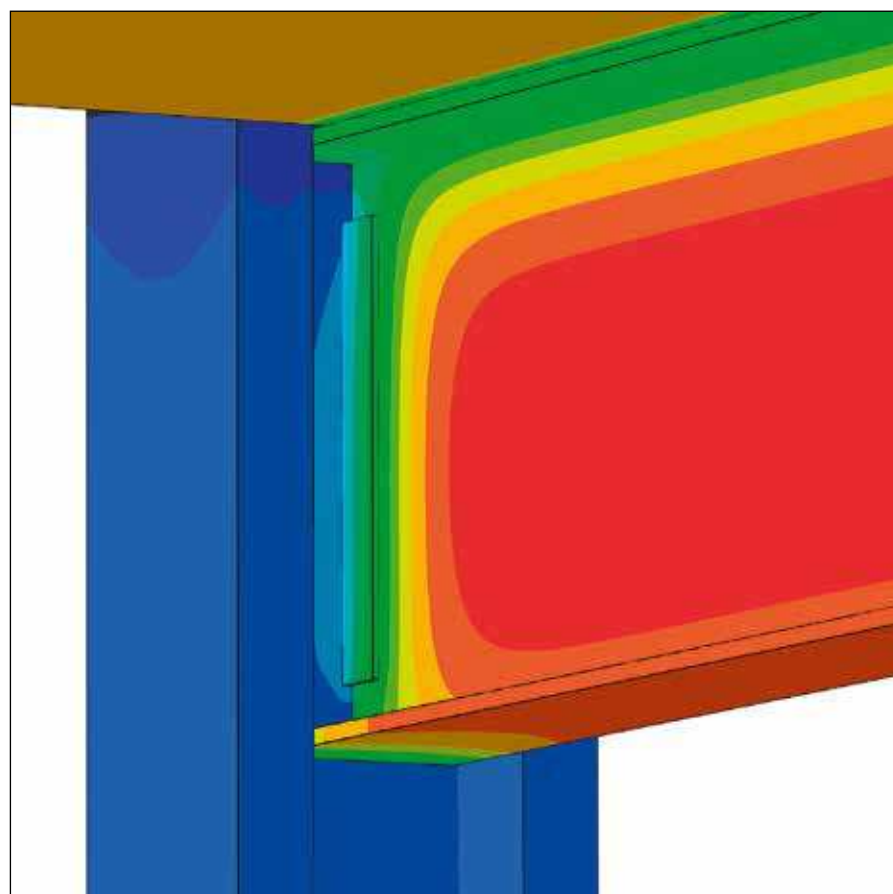
Impact on Practice

Since standard fire resistance design does not contemplate structural system performance or explicit performance objectives, there exists no practical method for a designer to quantitatively compare the level of safety provided by a structural fire engineering design to that provided by a standard fire resistance design. Hence, the industry-consensus embodied in the upcoming edition of ASCE/SEI 7 is critical, and should serve both designers and building authorities alike.

Until now, designers have had to decide on their own what constitutes a satisfactory structural fire engineering design. Consequently, there has been significant inconsistency in the industry

▲ Fire Exposure Analysis to a Structural System.

when deviations from standard code provisions are sought. For instance, there may be justification for the removal of protective insulation from steel structures based solely on temperature field information. The upcoming edition of ASCE/SEI 7 will prohibit this practice, obligating the designer to analyze the structural response due to the thermal demand without exception. Furthermore, the selective adoption of provisions from both standard fire resistance design and structural fire engineering for a given building project will be prohibited.



Opportunities

Structural fire engineering aims to provide an acceptable level of performance, but does not necessarily define specific requirements for design or construction. Hence, this approach can provide enhanced design freedom in situations where standard fire resistance requirements are found to be overly restrictive and/or unsuitable for the application. For instance, structural fire engineering may be necessary as part of building code variances in order to demonstrate the adequacy of innovative and/or nonconventional architecture.

Since structural fire engineering evaluates both demand and capacity, this approach allows the designer to influence more design variables as compared to standard fire resistance design, in which case the designer usually can only influence the level of fire resistance. This added flexibility provides opportunities to develop alternative designs that are optimized for aesthetics, functionality, and/or costs without compromising fire safety. Additionally, this approach allows

for efficient analyses of nonconforming existing building construction (e.g., historic preservation) prior to undertaking costly rehabilitation.

Future Outlook

The application of structural fire engineering for building projects has merit and enormous potential, but remains relatively limited. This can be attributed to the fact that designers and building authorities generally lack comprehensive, industry-consensus guidance for practicing and evaluating structural fire engineering. However, this emerging field is fast approaching a "renaissance period" with the release of ASCE/SEI 7 Appendix E. Furthermore, the ASCE/SEI Fire Protection Committee is currently developing a companion design guideline entitled ASCE/SEI Guideline: Structural Fire Engineering. This guideline will provide recommendations for analysis techniques, input parameters, structural acceptance criteria, and design examples to further support and supplement the content of Appendix E.

▲ Structural Analysis of a Girder-Column Connection.

In the future, it is envisioned that U.S. building codes will begin to incentivize the adoption of a structural fire engineering approach. For now, the adoption of a structural fire engineering approach is elective per the discretion of project stakeholders and building authorities. At a minimum, structural fire engineering represents an emerging market opportunity for qualified specialists that can provide stakeholders enhanced design freedom and explicitly-designed structural fire safety. At its paramount, building authorities may be empowered to require a structural fire engineering approach to better protect the public in certain instances, such as for buildings that have a high consequence of structural failure and/or specific potential threats.

► For more information, email kjlamalva@sgh.com

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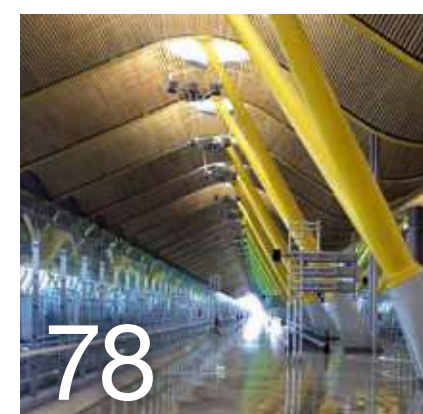
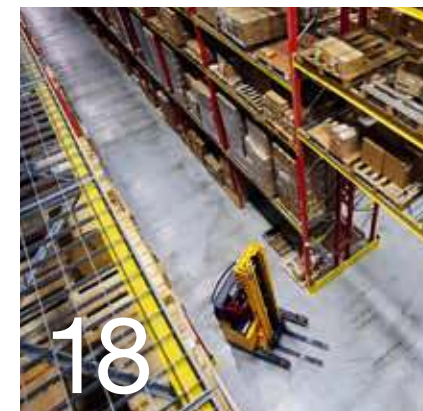
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The law of unintended consequences



Stewart Kidd

It's a well-established phenomenon that legislation, technical advances and major decisions are often found to produce negative, unforeseen consequences. The best examples are often found in decisions taken without studying all the facts. For example, during China's Cultural Revolution, the Party promoted a campaign to kill sparrows to protect the rice harvest. No one had considered the job the sparrows do in eating insect pests which then ate or spoiled considerably more rice than the sparrows had ever done. An estimated 45 million people died as a result.

In the fire safety world there are some devastating examples of this law, perhaps the most notable being the effects of asbestos fibres on human lungs. Asbestos was originally perceived as an incredibly useful building material, fire resistant, a great insulator, lightweight and easy to work into different types of structural element. Sadly, around 80 years after its introduction in 1930, research showed that its fibres when inhaled caused serious lung damage. Despite this awareness, asbestos was in widespread use for a further 40 years and asbestos cement was still available in the UK until 1999. No one knows how many hundreds thousands of people were killed or had their lives impaired by the fibres but it's no exaggeration to say that millions were (and are still) affected.

There have been less dramatic but no less problematic issues in other areas of fire protection:

- Toxicity of early fire fighting gases (such as CTC)
- Phasing out of polychlorinated biphenyls as a dielectric fluid for transformers and capacitors due to neurotoxicity
- Banning of BCF and BTM because of ozone depletion
- Fires during construction of timber framed buildings and increased combustibility of structures
- Combustibility of composite panels with polyurethane cores
- Impact of new building materials – especially combustible insulation
- Poor fire stopping in 'green buildings'
- Presence of photovoltaic panels

Other areas of concern

This list could be expanded to include an assessment of threats of fire from a number of newer products including Lithium-ion batteries, 2D electric bulbs. Consider also the Economy 7 electricity supply tariff which encourages the use of washing machines, tumble dryers and dishwashers overnight resulting in several fire deaths.

Lithium battery problems in mobile phones are known to have had a severe impact on the financial status of one manufacturer, Samsung. One estimate put the direct losses at more than US\$4 billion and the decline in the company's share price at US\$11 billion.

Bringing it all together: fire in La Farge, Wisconsin

On 14 May 2013 there was a fire in a 9-year-old building occupied by La Farge's largest employer. The fire started in a concealed roof spaces. The roof was supported by light wooden trusses and the whole space was insulated with recycled cotton/denim material.

The building was protected by sprinklers – dry in attics and wet in remainder (0.10gpm over 1950 square feet). Fire fighter access to the roof cladding was impaired by the presence of 130 photovoltaic (PV) panels and only became possible when the fire self-vented after partial collapse of the roof structure.

Metal cladding of the roof beneath the PV panels deformed as a result of the fire and the

local utility found that some roof cladding was 'live'. Current of more than 200 amps/50v DC was recorded.

When the roof trusses partially collapsed this caused a fracture in the dry sprinkler range pipes resulting in significant loss of water pressure from the mains fed sprinkler system. This loss plus firefighting demand drained all of the municipal water supply (101,000 US gallons) resulting in the need for a water shuttle using six tankers from a nearby river.

La Farge has an all-volunteer FD and was forced to call for aid from 10 other FD's. 116 fire fighters and 31 appliances responded for a fire which took 18 hours to bring under control.

Key issues of interest:

- Impact of PV panels on firefighting operations
- Early failure of lightweight roof trusses
- Combustibility of cotton insulation
- Untreated timber contribution to fire load and spread and its early failure.
- Fire demand emptied the town's only water tank

The fire was fully investigated by the NFPA and among their conclusions were two warnings which bring together some of the threads in this article.

"The use of natural fiber insulating materials is becoming more common as a means of meeting "green building" requirements. The fire service needs to be aware when this type of insulation is used within a building, because potential fire travel in vertical and horizontal spaces will have to be accounted for".

The report also noted that:

"Roof access amid PV panels can be difficult, with conduit and other PV system components being located throughout the roof area. PV panels cannot simply be "shut off" during firefighting operations, since they are always producing electrical current".

www.nfpa.org/news-and-research/publications/nfpa-journal/2014/january-february-2014/features/perfect-storm

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Security balance

Why security safety in public places needs to be synonymous with life safety



Donald P. Bliss

Vice President of Field Operations for NFPA

Brussels, Paris, Orlando, and Istanbul are all beautiful cities, centers of commerce, and cultural hubs. Sadly, they are also the targets of recent horrific terrorist attacks.

Terrorists continue to refine their ability to zero in on so-called “soft targets” such as shopping malls, hotels, clubs, and schools. Even locations thought to have high-security capabilities are not immune, as evidenced by attacks on passenger airport terminals. What these targets have in common are the large numbers of civilians that congregate in or around them, which make it easy to cause multiple casualties with comparatively low-tech methods.

Facility managers and government officials are under great pressure to protect these environments from lone attackers and more coordinated efforts. Security experts promote a range of solutions intended to make a potential target less vulnerable and therefore

less attractive to attackers. Methods include barriers or setbacks that restrict or prohibit vehicle access; gates, metal detectors, and X-ray machines at building entry points; and reinforced bars or shutters on egress doors and windows.

If not designed or installed properly, however, such security measures can severely restrict or prevent the ability of people to evacuate in the event of a fire or other emergency, and interfere with fire department access. I’ve seen plenty of examples in my travels in the U.S. and abroad: large concrete urns with vegetation placed directly against exit doors; barricades that prevent fire apparatus from getting close to a building and take time and effort to remove; and signs and barriers that make it difficult to understand how to exit the building. Security concerns sometimes dictate that an emphasis is placed on using only one way in and out of a building, which may create confusion and delays during an emergency. While this design is code compliant, the occupants may not realize that they can and should use the closest exit.

There is no reason why fire protection measures, egress requirements, and security methods and procedures can’t complement one another to create a safe and protected environment for building occupants. After all, security safety is life safety – a primary goal of NFPA 1, *Fire Code*, and NFPA 101®, *Life Safety Code*®, both of which offer cost-effective, practical, and reliable guidance for buildings large and small.

In 2014, NFPA sponsored a national workshop on school safety and security

that included stakeholders from code enforcement, fire service, law enforcement, school administration, and government to discuss challenges and identify solutions for effective school safety and security. The forum highlighted the importance of integrating life safety and security priorities. The output from that workshop is being blended into NFPA codes and standards that are currently being updated. A related effort between NFPA and ASIS International has been underway this year to make security a seamless part of the built environment, equal to fire and other hazards our codes must deal with.

Authorities having jurisdiction have a responsibility to work proactively with building owners, facility managers, law enforcement, and security professionals to overcome any perceived conflicts between fire code requirements and security needs. With the increased focus on security due to recent worldwide events, fire officials must be even more vigilant so that a tragedy does not occur because occupants are trapped in a building by the very systems intended to protect them from harm.

 **For more information, go to www.nfpa.org**

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If not designed or installed properly, security measures can restrict or prevent people from evacuating a building in an emergency.

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“SEAC considers that fluorine-free foams can be taken into account on a long-term basis but cannot be relied on for the coming years for such a critical use.”

Committee for Socio-economic Analysis (SEAC), Draft Opinion, on an Annex XV dossier proposing restriction on PFOA, its salts and PFOA-related substances, 10 September 2015, p14.

A plan of action



Wilf Butcher

CEO of the Association for Specialist Fire Protection

In the September issue of IFP, the ASFP outlined the lessons learned from its interactive question time event, held during Firex International in London earlier this year. This well-attended event, entitled 'A Question of Safety', consisted of a panel of specialists; each representing a different industry discipline, from the architect through to the building owner including; a criminal regulatory lawyer, a fire engineer, a Tier 1 contractor and specialist subcontractor, as well as passive fire protection manufacturers, an insurer, and representatives from building control, the fire service and a test house/certification body.

The breadth of debate identified several key issues influencing the quality and suitability of fire safety within the built environment, namely:

- Fragmentation within the construction design and build process
- The need to ensure adequate understanding and training for specifiers
- Improving standards of fire protection installation
- Ensuring competency in fire risk assessment
- Improving building resilience

The question time event clearly demonstrated a recognition from across the construction industry that fire protection is frequently specified and installed incorrectly leading to buildings that are not fit for purpose in relation to their intended fire performance.

In the early part of the last decade, the ASFP completed a detailed three-year 'Partners in Innovation' (Pii) project, partly funded by the then Office of the Deputy Prime Minister and the Department of Trade & Industry, where independent research on fire safety provisions in a wide variety of nominated types of buildings was collected.

The research repeatedly showed that a high percentage of compartment walls were either defective, through poorly installed fire stopping of penetrating service systems, or invalidated by incompetent maintenance.

In some complex buildings, detailed drawings were missing and occupants had no knowledge of the location of essential defences such as compartment walls. The findings of this project identified that some 80% of buildings in the study (which considered buildings of 2 years old and upwards) were not fit for purpose.

The ASFP question time event in June laid bare the reality that over a decade after this Pii project was produced, fragmentation within the construction industry remains a key concern, and continues to result in the frequent incorrect specification and installation of fire protection materials and systems. An issue also brought to light in no small way by the recent failings identified in several high profile PFI projects.

All the assembled experts at the question time event agreed that collaborative working across the whole design and build process is now of vital importance, and to this end agreed to regroup in early September for a 'Roundtable' event to look in further detail at ways in which such a collective industry approach could be considered.

The agreed objectives were clear, i.e. to develop structures, processes and best practice guidance to enable earlier engagement of fire safety professionals in the construction, design and build process, and aid better communication across the industry, in particular in relation to the inspection and management of buildings throughout their working life.

The wide-ranging discussions emanating from this ASFP 'Roundtable' event concluded that an overarching Construction Strategy was required and that agreement and support from all the professional organisations involved in the design and build process should be

secured. In particular, the group identified that there is an urgent need to:

- Develop a 'Plan of Works' process which incorporates fire at the design stage, to ensure that there is a detailed specification for fire protection in the initial design, and a schedule for fire throughout the construction process
- Ensure all professional bodies involved in design and build 'buy in' to this process
- Develop a supporting guidance document which will provide consistent and simple information to highlight what needs to be done at each stage of the process
- Investigate the possibilities for introducing a sign off process as construction progresses, with all information reaching the end-user to support adequate risk assessment
- Integrate the process with Business Information Modelling (BIM)
- Educate all in the built environment including the end user, inspectors, insurers, contractors and designers

Having now identified the objectives, work is now in hand to develop 'Plan of Works' metrics that can encompass the entire design, build, inspection and management process in relation to the fire performance of a building.

At its heart, there lies a fundamental need to educate all those within the Built Environment of the importance of fire protection within any building design. The ASFP is now in process of developing an appropriate training and education strategy to meet this objective.

The panel will come together again in the New Year to review progress, with the goal of offering the construction sector clear guidance, tailored to suit each stage of the process, from strategic definition through design concept and development, into the construction phase, handover and inspection and finally the on-going 'in use' of the building. It is anticipated that the development of such an overarching Construction Strategy can be achieved by the mid-2017, with work to raise awareness and implement the strategy continuing throughout the year.

 For more information, go to www.asfp.org.uk

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Dr. Sthamer and H2K set to deliver second Foam School

Following the success of their first foam school held in France in April, 2016 Dr. Sthamer and H2K are looking forward to their second foam school being just as successful.

The first event took place at the CNPP training centre in Vernon, a former refinery site which has been transformed into a well equipped centre for realistic hands on training. The centre has various props which create credible industrial incidents,

including storage tank and tank bund fires. The foam school attracted twenty delegates from six different countries with training being a blend of theory including tactics and strategy, workshops, demonstrations, new developments and practical training.

The second foam school is taking place from 27th – 31st March 2017 and will again be returning to the CNPP Training Centre in Vernon, France.



Image courtesy of Peter De Rios

 Please register on the H2K website www.h2k.nl

Haes protect university campus

Leading fire control panel manufacturer Haes are proud of their growing reputation for delivering innovative solutions to combat issues in different situations. This flexibility and forward thinking recently led to the development of the Esento range of networkable conventional control panels which are now being used to tackle projects across the globe.

One example of where this solution has been used to great effect is at the Chinese University of Hong Kong where

two Esento-32 control panels have been networked together to provide a 64 zone system to protect part of their main campus. Offering composite and highly flexible zonal programming features, the networking capabilities provided the ideal solution to what was looking like a complex and costly situation to resolve.

As networking features are included across the range of Esento 8 to 32 zone panels, these were able to be supplied off the shelf by Henry Engineering based

in Hong Kong. With the simple addition of a standard comms card, up-to eight Esento control panels can be networked in a daisy chain loop using RS485 communications. This provides the potential to protect up-to 256 zones at one time. The network is fail safe, a single open or short circuit in a network link will not stop the communications.

 For more information, go to www.haes-systems.com/int

Next generation fire door technology

Innovators of fire technology Geofire will showcase its Agrippa acoustic, digital fire door holder and closer at Intersec 2017.

The Agrippa products 'listen and learn' the sound of a building's specific fire alarm, releasing the door in the event of a fire. This new innovation in the industry is also battery-powered and wire free, so it can easily be retrofitted to any door.

Designed and manufactured at its factory in the UK, the team at Geofire designed the products to ensure they offer a practical, easily installed solution that does not damage flooring or expensive fire doors.

Andy Collinson, CEO at Geofire said: "The team at Geofire is very proud of this product; aside from its listening and learning

skills, it is a product that is easy to install, only requires C cell batteries, can be programmed for daily release and has adjustable closing speeds.

"The Agrippa range is perfect for environments such as care homes, schools, hotels and hospitals where it is essential to have doors in an open position at certain times of the day to aid access, but equally as important to ensure the doors are closed in the event of a fire to protect the building and its inhabitants."

Geofire manufactures a wide range of electromagnetic fire door holders and closers ranging from hard-wired solutions for new builds, to wire-free devices that take just ten minutes to install.



Image courtesy of Geofire

 For more information, go to www.geofire.co.uk

EN54 part 13: does your fire system measure up?

New infographic from Advanced helps ensure system performance and integrity. EN54 Part 13 is a real indicator of fire system performance but is widely misunderstood and sometimes misrepresented. To ensure everyone can check their fire system measures up, Advanced, one of the first companies in Europe to achieve Part 13, has produced a new infographic and 1.5m wall chart that sets out the Part 13 related issues you need to be aware of. EN54-13 is a European standard that ensures:

- Optimal fire system performance at all times
- Lives are properly protected in a real fire situation
- Complete peace of mind for specifiers, installers and end-users


The standard involves rigorous third party testing to prove that individual component parts will work together when combined into one system. EN54-13 is currently mandatory in several European countries, but even where not mandated, it is a mark of system performance and reliability.

The infographic explains five things you need to know about EN54-13:

- 1 Approved systems are rigorously tested for compatibility
- 2 Approved systems continuously check for faults
- 3 'Designed to' is not the same as 'Approved to'
- 4 Approved panels can save you time and money
- 5 Approved systems bring ultimate peace of mind



Each of these five features are expanded upon and clearly explained in the infographic, helping to ensure system performance and integrity – and therefore peace of mind. It can be downloaded or ordered from Advanced's website.

 For more information, go to www.advancedco.com/fire-systems/axis/axis-en/en54-part-13/order-infographic.asp

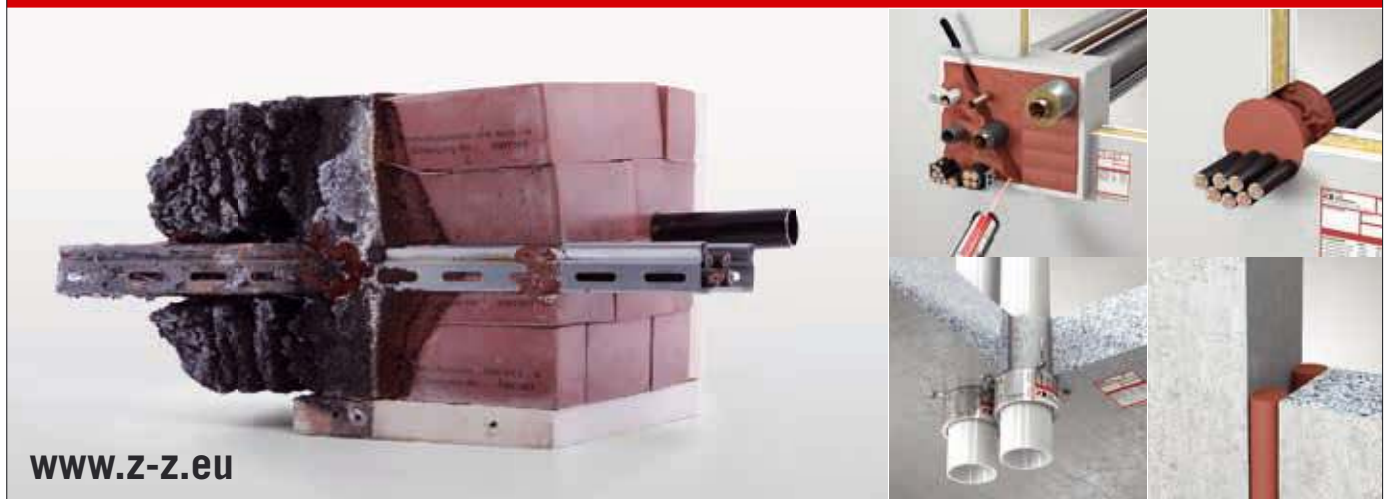
INTUMESCENT FIRESTOP SYSTEMS

- Mixed-, cable- and pipe penetration sealings
- Joint seals with movement capability

References:



Medicine Management Transport Industry



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- Fire & Rescue, German Pavilion
- Hall 2 / 3, booth 3-B15



ZZ ZAPP-ZIMMERMANN
INNOVATIVE FIRE-PROTECTION SYSTEMS

New range of explosion proof heat detectors from LGM Products

Finding the right cost-effective detector for hazardous areas in offshore environments is not always straightforward, but LGM Products' HDL probe heat detectors offer an excellent new detection solution.

These ATEX and IECEx approved explosion proof detectors can be used in a range of settings including fire alarm, fire suppression or fire and gas detection systems. They can also be installed on a conventional line or on an addressable loop via a switch monitor module.

IP66 rated, the detectors are particularly designed for hazardous areas in harsh environmental and corrosive conditions as well as tough industrial settings.

The detectors are able to meet most specifications with a range of alarm temperatures available and several box sizes for increased terminal capacity. LGM

Products also supplies a marine standard box for offshore and onshore applications.

LGM Products' Sales Director, Nic Mogford-Reves said: "The versatility and durability of these heat detectors means they are particularly suitable for a range of on and offshore applications from drillships to wind turbines as well as oil and gas platforms.

"The addition of these units to our product offering complements LGM Products already extensive range for specialist fire detection."

LGM Products has more than 25 years' experience supplying heat detection equipment to the marine industry. Please visit LGM Products' website or contact their sales team.

 For more information, go to www.lgmproducts.com



Advanced adds more zones to its QuickZone fire panels

Global fire systems leader Advanced has extended the range of its QuickZone range of conventional and twin-wire fire panels by adding a 16-32 zone option. This complements the existing 2-4 and 4-12 zone options and significantly enhances the versatility of the panel range.

QuickZone offers a choice of three control panels, allowing installers to specify the system that best matches their performance and price requirements. QuickZone (2-4 zones) is the most straightforward of the two and is appropriate for quick, simple installations. QuickZone XL (4-12 and

now 16-32) has a rich array of features that can support passive or fully-functional repeaters; it is ideal for larger conventional or twin-wire installations with more involved programming and configuration requirements. QuickZone XL also offers zone expansion cards and a range of installation features including earth bars.

Both product lines are approved to EN54-2&4 and are quick to install, quick to configure and quick to maintain.

Both also feature false alarm management functions according to one of three different modes, as described in EN54-2. QuickZone supports mode A while QuickZone XL supports modes A, B and C. False alarm management can be selected for individual zones on both panels.

 For more information, go to www.advancedco.com



UL recognised component for TLX Technologies

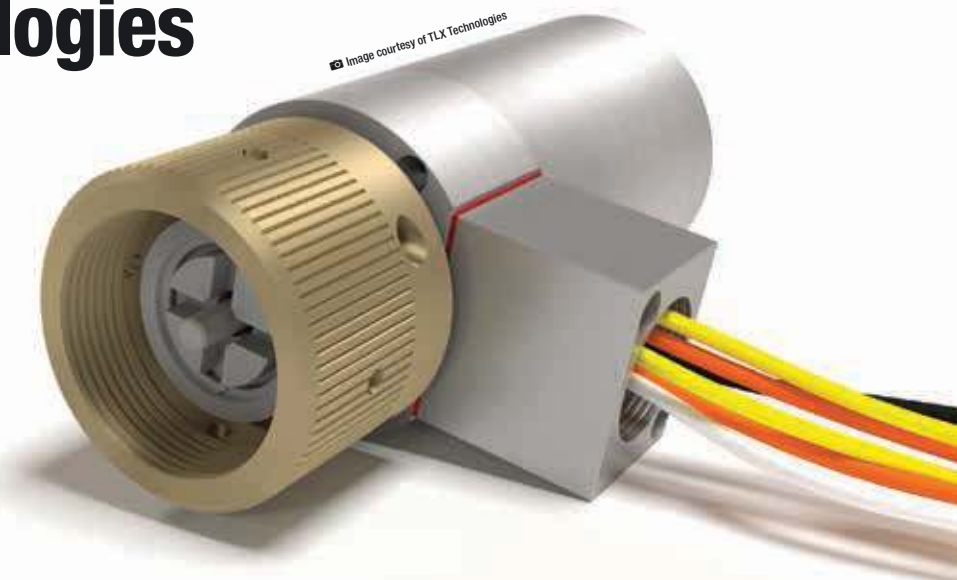
TLX Technologies is excited to announce that our next generation supervised fire suppression actuator is now a UL recognized component to UL 864 for not only indoor dry but outdoor wet applications. TLX's supervised latching electric actuator meets required UL and NFPA wiring codes and standards and includes an internal supervisory mechanism that ensures the actuator is properly installed on the discharge valve of the extinguishing agent storage container. Integration of the supervision mechanism eliminates the need for any additional components, connections and wire paths; resulting in a streamlined, NFPA compliant solution.

The supervised latching solenoid actuator comes standard with six wires. Two wires are used for activation and four are used for supervision of both the actuator placement as well as connection to the fire panel. Factory-wired leads fed through an integrated conduit port in the housing have been added to meet the UL and NFPA wire codes required on all fire suppression actuators.

The supervision on the actuator allows for fully engaged installation detection to be configured to your exact needs. Rugged construction, ultra-fast response and the ability to be reset ensures reliable and outstanding performance over the actuator's entire 15-year life span. TLX's complete family of actuators and direct-acting solenoids for fire suppression systems meet the requirements of NFPA 2001 (Sec. 4.3.4.1), UL 2166, UL 2127 and FM 5600.

For over 16 years, TLX Technologies has worked with manufacturers to develop and manufacture custom actuators and valves to meet the challenging demands of active fire suppression systems.

 For more information, go to www.tlxtech.com



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POLFLAM®

Large fire-resistant glass – for indoor and outdoor application

POLFLAM is an independent European manufacturer of fire-resistant glass. The company applies its specialist technology in the production of its hydrogel. POLFLAM produce glass for varied applications, both indoor and outdoor as well as Classes EI 30 to EI 180 and this includes curved glass.

Nonetheless, the brand's hallmark is glass panels of exceptionally large dimensions: 2200 x 4200 mm, and more recently even to 2420 x 4620 mm – and that was for Class EI 60.

Glazed partitions which provide maximum daylight inside the building are the dominating trend in modern architecture today. Wherever we find large-surface glazing functioning as curtain walls, we find ourselves normally limited by the glass sizes currently available in the market. This is because large-size fire-resistant glass panels are a technology challenge for manufacturers.

High-rise buildings which stipulate a



fire-resistance of Class A are required to use partitions as high as Class EI 60.

In 2015 POLFLAM introduced Class EI 30 glass panels measuring 2200 x 4200 mm onto the European market which broke down an important technology barrier within the industry. Soon higher-class glass of the same format also made

▲ POLFLAM glass is used both for outdoor and indoor applications. It can be fixed in any kind of fire-safe construction joinery or used in frameless systems.

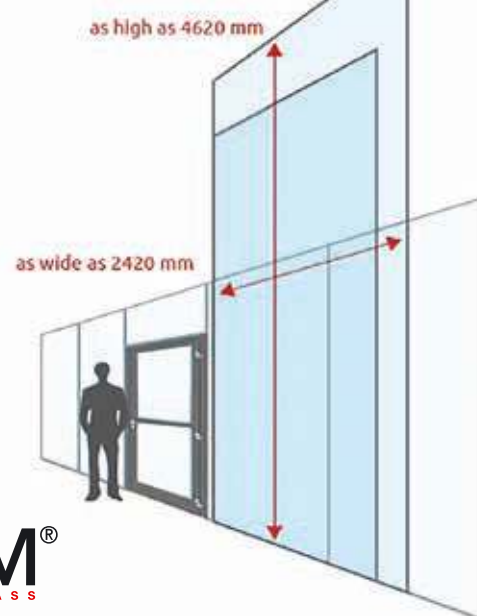
its way into the market. In September 2016, following extensive testing of the Class EI 60, in a notified laboratory, the company's range was extended to POLFLAM® EI 60 symmetrical fire-resistant glass in a record-breaking size: 2420 x 4620 mm!

Large-sized fire-resistant glass panels mean less construction members in the partition which translates into a measurable increase of the indoor light saturation index as POLFLAM® glass has an exceptional light transmittance factor. On top of that, there is the indisputable visual effect: the huge glass panels are truly impressive.

Breaking down technology barriers is POLFLAM's hallmark. That means that it will not take long for us to look for new solutions. The company's research and development department has certainly not had the last word!

➔ For more information, go to www.polflam.com

► Large-size fire-resistant glass is POLFLAM's hallmark.



MODERN FIRE RESISTANT GLASS

- available in all fire resistance classes: EI 30, EI 60, EI 90, EI 120 and EI 180
- large dimension curved glass with large arching radius in all EI classes
- own production technology of fire-resistant glass, own testing facilities
- fire-resistant gel made in POLFLAM
- glass mounted in any kind of fire-safe construction joinery (aluminium, wooden or steel) as well as in frameless systems



Unique parameters

- exceptional sizes of glass panes: up to 2200 x 4200 mm – in all fire resistance classes (up to 2420 x 4620 mm in the class EI 60)
- high light transmittance factor – Lt up to 87.6%
- high acoustic insulation index R_w – up to 45 dB (no need of multiple-glazing)
- symmetrical design of the glass

POLFLAM® fire-resistant glass of any class holds the CE marking and can meet the strictest fire-protection requirements applied in any country in the EU.



www.polflam.com

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Tornatech

UL Listed and FM Approved Electric and Diesel Fire Pump Controllers

World Class Products and Customer Service

Tornatech specializes in the conception and manufacturing of fire pump controllers in accordance with the NFPA 20 standard. They are UL listed and FM approved. In addition, we have developed controllers that meet various local standards and approvals. Over the past 30 years we have gained our customers' trust and confidence by supplying quality, innovative and reliable Fire Pump Controllers.

Over the years, we have not only introduced innovative products but also developed a network of subsidiaries, sales offices and authorized service dealers located around the world. We have manufacturing capabilities in Montreal, Canada, Wavre, Belgium and Dubai, U.A.E, a sales office in Singapore as well as sales representatives in the U.S.A and

Latin America. Today, our products are installed on 5 continents and in over 80 countries.

We offer a complete line of electric fire pump controllers covering all types of installation requirements such as residential, limited service, full service and variable speed with voltages ranging from single phase 220V and 3 phase from 208V to 7200V and horsepower up to 5000hp. Full voltage and reduced voltage starting methods are offered to suit power grid requirements. Mechanical features include a compact enclosure design, definite purpose disconnecting means and emergency start handle.

Our diesel engine fire pump controllers are built to start and run all listed and approved diesel engine drivers, 12V.DC or 24V.DC, and incorporate the latest NFPA, UL and FM requirements. Redundant battery chargers ensure the starting reliability of the engine and its compact design allows for discrete mounting in the pump room.

ViZiTouch V2 Color Touchscreen Operator Interface

As the first manufacturer to incorporate touchscreen technology in their fire pump controllers, we are pleased to announce the release of the NEW ViZiTouch V2 color touch screen operator interface. The new 7 inch display has intuitive graphics, quick and easy commissioning, user-friendly operation and maintenance data logging capabilities. An on-screen menu with intuitive icons is accessible from any page, providing quick and easy onscreen navigation. For more information about our ViZiTouch V2 Operator interface visit www.tornatech.com/ViZiTouchV2

Model DSM: Fuel Fill Station Monitor For Diesel Fire Pump Applications

The Model DSM fuel fill station monitor for diesel fire pump applications serves as a "Stop Fill" visual and audible annunciator. With its NEMA 4X enclosure and standard supplied anti-condensation heater and thermostat, the DSM is built to be installed outdoors near the diesel fuel fill pipe. The dead front enclosure makes it vandal-proof so the DSM does not need to be mounted high off the ground to avoid being vandalized.

Model OPD: UL Listed Disconnecting Device For UL Listed and FM Approved Electric Fire Pump Applications

The Tornatech Model OPD electric fire pump disconnecting device provides a UL listed means of disconnecting and consequently isolating the fire pump controller from incoming power and removing the risk of arc flash. It also provides complete overcurrent coordination upstream of the fire pump controller.

For more information, go to www.tornatech.com

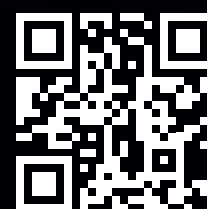


▼ Tornatech Fire Pump Controllers with ViZiTouch V2 operator interface.

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TENMAT

Intumescent expand worldwide appeal

Tenmat Limited have been developing and producing “cutting edge” solutions for the worldwide passive fire protection market for over three decades. The state of the art Manchester factory employs over 200 people and is the UK’s largest manufacturer of intumescent materials and finished products.

The key to Tenmat’s success is continuous innovation and developing of products to meet the most onerous fire test standards worldwide. This has led to Tenmat being the largest manufacturer of Fire Rated Light Covers for both Europe and North America as well as winning the Queens Award for Enterprise, Innovation in 2012 and International Trade in 2013.

What many in the industry do not

realise is that a large proportion of Tenmat’s business is working with other passive fire protection manufacturers to design, develop and fire test products for them with will use Tenmat intumescent material as its functioning component.

Tenmat has a fully refurbished Innovation centre and a creative mix of both experienced fire engineers as well as inventive graduate engineers who work together to produce a ready stream of new and improved products to meet the ever changing standards in the fire industry.

As well as having our own in-house testing facilities, Tenmat also work very closely with the biggest fire test laboratories and so can assist customers from initial product conception through to the final testing.

Tenmat fully understand that many customers have the best ideas, but not necessarily the facilities or resources to turn those ideas into finished firestopping

solutions and that is where the Tenmat team can assist in turning ideas into reality.

Even when customers do undertake the development work themselves, Tenmat are able to, using the strictly controlled and audited production facility, produce the highest quality intumescent materials, components and end products to meet the highest quality standards.

Whilst Tenmat supply and develop intumescent solutions for a vast array of applications, particular areas of expertise include:

- Pipe Closers – High Expansion Intumescent materials for fast and effective sealing
- Ventilated Fire Barriers for use behind external rainscreen/cladding/facades
- Recessed Light Fire Protection – to European and US test standards
- Electrical Socket Protection
- Linear gap seals

▼ Fire rated light cover over light fitting.



► Vacuum formed shapes.



Recent projects include the development and testing of fire protected consumer units (electrical fuse boxes) for one of the largest manufacturers in Europe, a firestop seal for European electrical sockets and seals to provide a fire rating to PVC window profiles for a major manufacturer.

The range of Tenmat materials is extensive ranging from 0.5mm thick intumescent papers through to 60mm thick compressible intumescent boards.

A variety of sizes, shapes and performance grades can be produced, with both batch production or continuous high volume production possible.

However, what sets Tenmat apart from other manufacturers is the ability to vacuum form complex 3 dimensional shapes in intumescent materials. This, combined with the ability to control the direction of expansion makes Tenmat the obvious choice for customers who want

to differentiate themselves with novel and higher performing products.

If there is a need for assistance with the development of passive fire protection products, or simply a need for supply of quality intumescent materials in flexible, rigid, flat or shaped forms then Tenmat can help.

► For more information, go to www.tenmat.com



TENMAT
FIRE PROTECTION SOLUTIONS

MADE IN BRITAIN

Winner of the Queen's Award for Innovation and International Trade

UK manufacturer of Intumescent Materials






- Expansion ratio from 2:1 up to 60:1
- Thickness from 0.5 to 60mm+
- Range of sizes up to 2200x1100mm
- Flexible, rigid, and vacuum formed materials
- Bespoke materials can be tailored to customer requirements with full R&D facilities

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Safety for warehouses – video fights fire

Warehouses can be a firefighter's nightmare. Although warehouse fires usually result in few bodily injuries or fatalities, the lack of early fire detection technologies and the immense fire loads in warehouses often result in firefighters arriving on the scene just to see that it's too late – the fire has already become too hazardous and too large to risk entering the warehouse. Total loss of the building is all too often the typical result.



Sören Wittmann

Video-based fire detection technologies promise faster and more accurate detection of such potentially devastating fires, allowing firefighters to limit the damage. Most warehouses are characterized by high ceilings and very large areas, also resulting in huge volumes of air inside which is a major challenge for traditional fire detection technologies. Usually, such technologies have been developed to discover the presence of smoke, heat or flames. In warehouse environments, heat detection by means of sprinklers is

▼ Very large open spaces, high ceilings and high fire load are typical characteristics in warehouses.

a commonly used technology, but even fully compliant sprinkler systems may not be able to extinguish the fire they detected. Using sprinklers also bears the potential of the water doing more harm than the fire itself. They are designed to save the building, not the commodities inside.

Smoke detection is considered to be a reliable option for early fire detection. Smoke is usually produced way before any flames become visible. However, traditional point smoke detectors need the smoke to migrate to their location, which is a challenge in large warehouses. Mounted at ceiling level, the detectors are usually far away from the source of the smoke. Further, given the large volume of a warehouse, the smoke is being



Sören Wittmann is Product Manager Special Detectors at Bosch Security Systems.



heavily diluted. A starting fire may thus not produce enough smoke to be detected or not enough buoyancy to drive the smoke upwards to the ceiling where the detectors are located. The only smoke detection technology that does not need the smoke to migrate to the sensor is video. Video-based smoke detection is basically a set of algorithms in an intelligent camera. These algorithms process the camera image to determine whether smoke is present, and they can detect a fire as soon as the smoke enters their field of view. This way they can cover larger areas and volumes than point, beam or aspiration detectors, making them a much more affordable solution for warehouse environments. Further, in such environments video is much faster than conventional smoke detection. It can detect a starting fire within 10 to 30 seconds while other technologies will need minutes due to the slow smoke migration – minutes that can make the difference between a nuisance and a disaster.

Detect smoke and flames

But video can do more than just smoke detection. If you use one set of algorithms to identify smoke, you can just as well

implement another set to deal with flames. Flame characteristics of different fires are well understood, and thus flame detection through intelligent algorithms is just as reliable as smoke detection. Using video to detect flames adds additional value by way of full video visualization of the scene. The operator can therefore precisely locate the seat of the fire as well as involved commodities, potentially providing valuable time for firefighting. The video image can also be used to verify alarms in the first place, avoiding costly false alarms.

However, video-based fire detection (VFD) is by itself highly immune against such false alarms. Intelligent algorithms within the camera allows for very precise differentiation between a real fire and disturbing values such as movement, reflections or changing lighting conditions. In internal tests, Bosch Security Systems has therefore achieved highest detection reliability in all test fires (TF1 through TF8) as specified in EN54.

Video-based fire detection systems scales well from a single camera to a networked system of distributed cameras with a central console and management

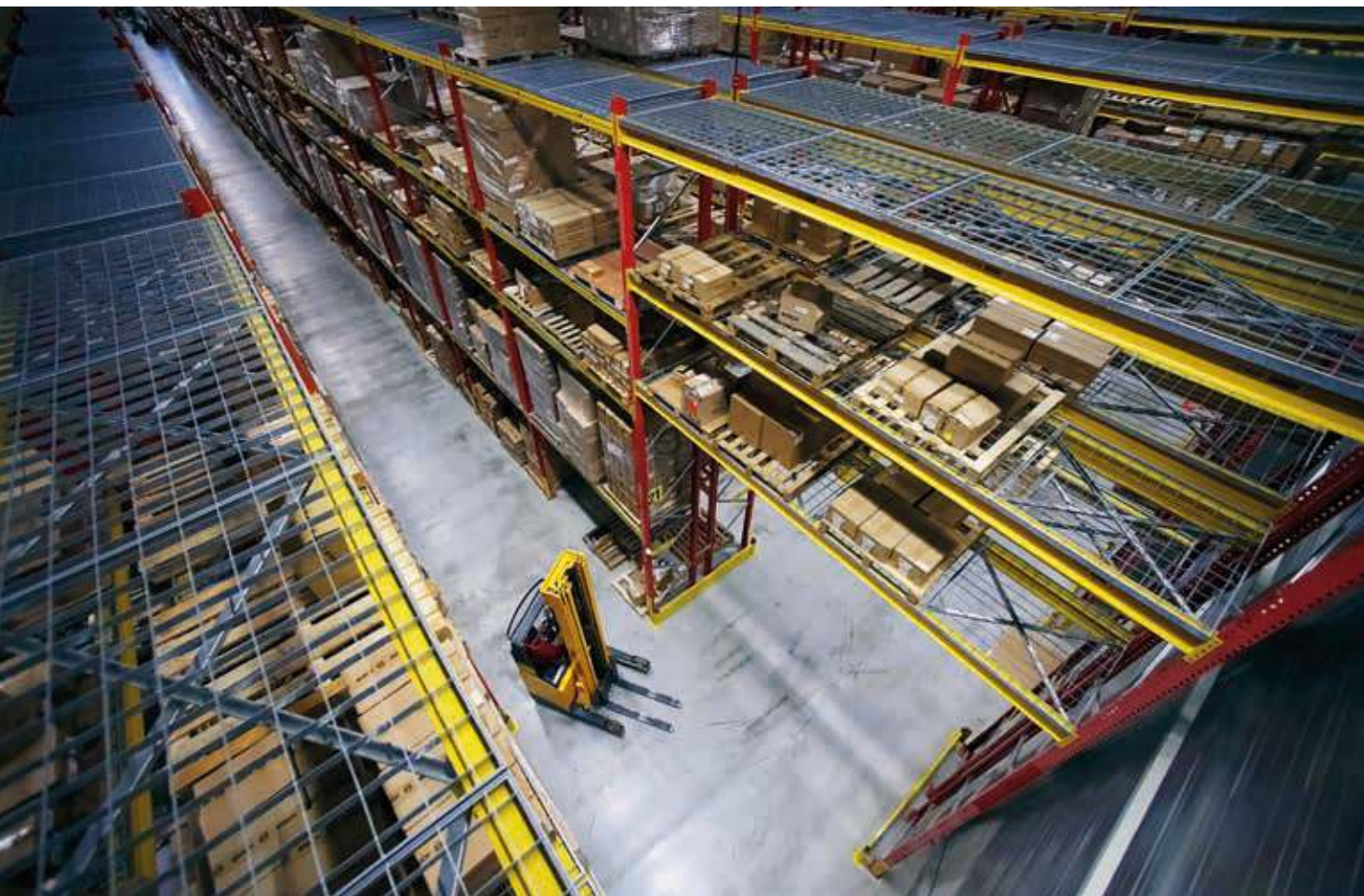
▲ Intelligent video analytics can distinguish real fires from disturbance values like backlights, illumination and movements.

system. They can transmit alarms via Ethernet to the monitoring center or even a mobile device, but can just as well relay it to an existing fire alarm panel. Cameras cover broad areas, need little maintenance and do not even require individual power supplies. With Power over Ethernet (PoE), power and video signals use the same cable, even allowing the camera to benefit from the uninterruptable power supplies (UPS) in the Ethernet switches. Video-based solutions thus come with a very affordable cost of ownership.

Video combines safety and security

While video-based fire detection can be more reliable and more affordable than other technologies in most warehouse scenarios, it offers an additional benefit that no other option can. It allows to combine safety and security.

Having installed a video-based fire detection system, the operator of a warehouse can use the very same



▲ Video-based fire detection can be used in high-bay warehouses with narrow aisles and high fire load.

cameras for video surveillance. There are lots of reasons to monitor the warehouse, avoiding theft being the most obvious one. But just as intelligent algorithms can identify smoke or flames, others can detect unusual movements as well as blocked aisles or emergency exits, thus increasing safety and operational efficiency. And finally, a lot of fires in warehouses are actually induced by intentional arson, and here video surveillance can be a very efficient means of prevention.

In the United States, the National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association (NFPA) have published surveys indicating that arson was the cause of 13% of all warehouse fires (second only to electrical problems with 14%). And being designed for destruction, arson causes much more damage than incidental fires. Representing 13% of the fires, arson resulted in 21% of the damage done. In the UK, the Fire Protection Association

(FPA) even published data indicating that arson was responsible for 46% of all large fires in warehouses in the late 90s. Video surveillance combined with video-based fire detection can therefore not only offer fast and reliable detection of warehouse fires, but potentially also prevent a lot of them to begin with or help with root cause analysis.

Two approaches to VFD

There are two different approaches to video-based fire detection. VFD can complement existing technologies such as sprinklers or smoke detectors, greatly increasing speed and accuracy of fire detection. Next to warehouses, there are many other scenarios where solutions exist, but are unsatisfactory. These include environments with high rooms, dusty and humid areas or very large open spaces. On the other hand, VFD can be a solution for applications where no other solution exists. Think of saw mills with their extreme fire load – according to NFIRS and NFPA sawn wood is even the most common material to ignite in warehouses. Hangars or large monitoring areas such as generator halls in power plants are other examples.

Preconditions for VFD

Although video-based fire detection offers a lot of benefits including additional safety, it must be mentioned that today it cannot replace EN54 installations. It is an Active Work Item in ISO, though, and so you can expect certification in the not so distant future. FM3232 and UL286B are available today. However, VFD can be the best available option where no EN54 compliant solution exists anyway. In some situations it even has the potential to enable insurance coverage for an environment that so far had to go uninsured. In other scenarios it may very well complement existing fire alarm systems to increase the safety level and integrate video surveillance.

Another condition is native to video – it needs light. Flames and/or smoke must be visible for the video camera to detect it. Today Bosch offers VFD with its IP camera starlight 8000. The company produces its Starlight series for very low light conditions, which will, once integrated, offer video-based fire detection also in very unfavorable surroundings.

For more information, go to www.boschsecurity.com

The ultimate smoke detector.



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UL's iconic Steiner tunnel withstands the test of time

Towards the beginning of the 20th century, major fires in US buildings aroused public concern and demonstrated the need to address and regulate the burning characteristics of building materials. In the early 1940s, fires at the Boston Cocoanut Grove Nightclub, La Salle Street Hotel (Chicago), and Winecoff Hotel in Atlanta resulted in over 650 deaths. These three fires had a common theme – rapid flame progression along the surfaces of the interior finish greatly contributed to uncontrollable fire spread.



Dwayne Sloan

Dwayne Sloan is Manager, Principal Engineers, Building Materials & Suppression. Distinguished Member of Technical Staff.

There was a dire need to manage these types of building fires through passive fire protection and regulating material characteristics. By the 1940s, research work at UL (Underwriters Laboratories, Inc.) had led to this prevailing “reaction to fire” test method using a 25 foot long tunnel to characterize the surface burning fire and smoke characteristics of interior finish materials.

The 25-foot tunnel became known as the Steiner Tunnel, named in honor of the primary UL Engineer, Albert J. Steiner. Its prominence in the fire protection community was based on its ability to

provide cost effective, repetitive testing and use of a sample size that could characterize interior finish materials used in actual installations. After a few refinements the first formal test method was published as Standard UL 723 by UL in 1950. The test method was formally adopted by American Society for Testing and Materials (now ASTM) in 1961. The National Fire Protection Association later adopted the method as NFPA No. 255 in 1955. Today this method is currently described in UL 723 and is also commonly known as ASTM E84.

The regulation of rapid progression of fire on interior finish materials is as relevant today as it was 70 years ago. A more recent example of the need for interior material fire assessment is the Rhode Island Station Nightclub fire of

▼ The Steiner Tunnel Apparatus.



Image courtesy of Chong Choi

► Gas Burners Deliver 1.4 m Test Flame.

2003. In this fire, rapid progression of flames of the interior materials, which were not examined to proper standards, led to the building being engulfed within minutes.

Steiner Tunnel Apparatus

The tunnel apparatus is constructed such that materials under test have an exposed area of 18 inches wide by 24 feet long, up to a thickness of approximately 5-6 inches, maximum. The test is conducted with the sample mounted in the “ceiling” position of an enclosed tunnel furnace measuring 18 inches wide by 12 inches deep by 25 feet long. Two burner outlets, spaced eight inches apart, deliver a nominal 5000 BTU/min., 4½ foot flame to provide the ignition source to the underside of the mounted specimen. The test continues for a 10-minute duration. A controlled inlet draft of 240 feet per minute facilitates horizontal flame propagation throughout the test.

Test Procedure

With all of the controls set for the tunnel operation, the room is darkened, and the gas burners are ignited. Observers record the distance and time of maximum flame front travel through the tunnel observation windows. Flame front advancement is recorded at the time of occurrence or at least every 30 seconds, if no advancement is noted. The test continues for a 10-min period. A light and photoelectric cell, mounted in the exhaust duct, records smoke obscuration during the test. Flame spread and smoke developed indices are reported in comparison with calibration materials of red oak lumber and inorganic reinforced cement board. Red oak propagates flames to the end of the tunnel in approximately five and a half minutes and generates a flame-spread index of approximately 90. A smoke developed index of 100 is assigned for red oak. Inorganic reinforced cement board generates flame spread and smoke developed indices of zero.

► UL723 / ASTM E84 – Popular US Reaction to Fire Test Method.



Image courtesy of Chong Choi

US Codes

UL 723 and ASTM E84 are found throughout US model codes and many jurisdictional requirements. Many US Codes require a Flame Spread of 25 or less, and a Smoke Developed of 50 or less for materials used within plenums. For materials used as interior finish, most US codes require the following Class ratings for various installations and based on occupancy types:

Typical Class Ratings		
Class	Flame Spread	Smoke Developed
Class A	0 - 25	0 - 450
Class B	26 - 75	0 - 450
Class C	76 - 200	0 - 450

Closing

The Steiner Tunnel test method, as described in UL 723 and ASTM E84, is one of the most popular “reaction to fire” test methods within the US. This method has been used for decades with success to assess the comparative surface burning characteristics of building materials for several decades. The selection of materials with appropriate, code compliant results has proven to be a useful tool in mitigating the hazards associated with flame propagation on interior surfaces.

► For more information, go to www.ul.com



Image courtesy of Chong Choi

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In with the new... Greater certainty for specifiers

The fire cable industry has welcomed the introduction of the new British Standard BS 8592:2016 Electric cables; thermosetting insulated, non-armoured, fire-resistant single core non-sheathed cable of rated voltage 450/750V. This is first British standard for this type of cable, and was published on 31st March 2016.



Dr Jeremy Hodge

The new single core cable standard ensures that these small-sized cables, commonly used for final circuit wiring of critical systems such as fire alarms and emergency lighting, now have a specification. These cables have been manufactured, distributed and widely used globally for many years but have not had a full specification, which has resulted in some variability between cable manufacturers. Now, the design and performance specifications are clearly defined, giving specifiers, designers and installers greater certainty that the cable should be fit for purpose.

Previously, cable manufacturers made reference to other similar standards and to test methods to support their design and manufacturing processes, however the new standard negates any grey areas. BS 8592:2016 will begin to be referenced in system design standards and will deter unsuitable alternatives from being used.

Put to the test

One of the major requirements to meet the new standard is to have 'low emission of smoke and corrosive gases when affected by fire'. To describe a cable as Low Smoke Halogen Free (LSHF), it must generally pass two tests; a smoke cube test, which sets a maximum accumulated smoke density produced when burning the cable with a standard fire, and; a corrosive and acid gas test (related to the presence of halogens) where the cable materials are roasted in a tube furnace and must give off a maximum of 0.5% acid gas.

The cables are subjected to an IEC 60331-3 dry fire resistance test to meet the requirements of the standard. However, no water-based tests are included in the standard, but these

can be carried out separately using special protocols for single core cables. Commonly, end users and regulators specify additional BS 6387 tests for single core fire resistant cables. All the tests can be carried out in the BASEC cable tests laboratory.

International impact

This cable type is commonly used across the Middle East and Asia in critical emergency circuits so it is important for specifiers and fire engineers working in these regions to be aware of the new standard. In locations such as the United Arab Emirates and Hong Kong, where steel reinforced concrete construction is widely used, the buildings often use embedded conduit for power, lighting and safety circuitry.

The reason for this is that it is easier to use small single core cables than larger sheathed cables with this construction method. This differs from the usual construction practices in the UK and Europe, where sheathed cables are more commonly used for emergency circuits.

BASEC has an international program supporting reputable cable manufacturers to provide independent technical information to educate and inform engineers about new fire standards and revisions to ensure they are fully conversant with up to date fire cable regulations.

Cable test and certification bodies, such as BASEC, cannot test cables for every fire-related eventuality, however, by having consistent testing methods detailed in product standards such as BS 8592:2016, it ensures that cable products provided by manufacturers for test can be directly compared to a specification to ensure performance is benchmarked.

Dr Jeremy Hodge is Chief Executive at the British Approvals Service for Cables (BASEC).



BS 7629-1 streamlined in new edition

The 2015 revision of BS 7629-1 has cleared the clutter from the standard and tightened requirements to prevent any misunderstandings in the supply chain. This revision impacts any UK fire alarm system (BS 5839-1) and emergency lighting system (BS 5266-1) where circuit integrity is needed.

For some time, there had been industry demand to bring the BS 5839-1 specified test methods and grading scheme into the product standard to simplify the specification process. Since its publication late last year, the revision has generally been well received.

Clearer marking and grading

The cable marking requirements are now quite specific. A number of fire test standards such as BS EN 50200 and BS 8434-2, codes of practice such as BS 5266-1, BS 5839-1 and BS 8519 and performance levels PH15, PH30, up to PH120 were not previously controlled and now, cannot be marked on BS 7629-1 cable. Some markings were becoming very long and complex which was unintentionally causing confusion.

However, where there was no requirement for fire performance markings on the external sheath in the 2008 version, BS 7629-1:2015 necessitates that for

cables meeting the fire test requirements for categories 'Standard 30', 'Standard 60', or 'Enhanced 120', this grading is to be marked accordingly on the sheath.

It also requires that if a third party independent approval organisation is used, such as BASEC, its mark of approval shall be embossed, indented or printed throughout the length of the external cable sheath.

Cable test changes

An important revision has been a change to the assessment of the tin coating of the circuit protective conductor / drain wire. This coating helps prevent possible long term corrosion, which could affect performance in use.

The new test appears less prone to interference from scraping damage caused when making or disassembling the cable, however prior to its publication, there was a lot of debate about the test and whether it should even be included in this standard. Many products were found to not be compliant to the old test (EN 1360:2002 Clause 5) which could delay the granting of product approval until necessary changes to the tinning process were achieved, usually to add additional tin. In practise, it has had a positive outcome and UKAS has now accredited BASEC to conduct the new test.

One of the notable fire resistance test

▲ Cable test BS 6387 category W has been removed, but it is expected that many manufacturers and specifiers will continue to request it.

revisions is that BS 6387 categories C, W, and Z have been removed from the standard. These include the traditional water-based test. However, these tests may still be conducted, and marked on the cable. We expect the new classes of performance to be incorporated into future revisions of Codes of Practice such as BS 5839-1 (Fire alarm and detection systems) and BS 5266 (emergency lighting).

Also, additional tests have been included for shrinkage of insulation and sheathing for the first time (generally applied to a number of other cable standards – EN 50525 series, BS 7211, BS 5467, BS 6724, BS 7846).

Both these new cable standards, BS 8592:2016 and BS 7629-1:2015, define specifications for fire resistant cables providing circuit integrity. As such they are excluded from the introduction of new Construction Products Regulation (CPR) requirements for reaction to fire for cables, which is underway now. BASEC has been appointed a Notified Body for the delivery of the full range of CPR cable services.

For more information, go to www.basec.org.uk

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Smoke without fire

Evolution of protocols for testing fire safety electrical cables has led to an important divergence between fire performances provided by electrical cables and fire performances expected and needed. The understanding amongst most specifiers, sellers, installers and users of fire safety cables is that the products they buy and use will provide a level of fire performance in real emergency conditions commensurate with the performance implied by the testing procedure.



Jamie Groves

Jamie Groves is Sales Director, Mineral Insulated Cable Company (MICC) Ltd.

Unfortunately, unless exposed to exactly the same fire conditions as in testing this is unlikely to be the case

Before 1970 there were no common standards for testing electrical circuits for fire survival. Since 1932's Mineral Insulated (MICC cables) had been used for high temperature resistance and it was considered almost common sense that these cables were the best option available for fire performance.

In the 1970's new polymeric cable insulations evolved and manufacturers found that with Silicone Rubber or Glass Mica Tape insulation they could make cables to pass some flame tests. In 1970 IEC 331 was born and formed the basis

for BS6387:1983 this is still the basis for most flame circuit integrity testing of cables in Europe and Asia.

In America, Canada, Australia, New Zealand, Germany and Belgium simple flame tests on cables are no longer accepted and certification requires furnace testing of full 'wiring systems' to the "Standard Time Temperature" protocol ISO834-1, EN1363-1, AS1530 pt4, BS476 pts 20-23 & in USA ASTM E119-75.

It is not commonly understood that fire resistant cables, where tested to common British flame test standards, are not required to perform to the same time-temperature profiles as every other structure, system or component in a building.

Specifically, where fire resistant structures, systems, partitions, fire doors, fire penetrations fire barriers, floors,

▼ Modern furnace test.



Image courtesy of MICC



▲ Airports, 'an area of special risk'.

walls etc. are required to be fire rated by building regulations, they are all tested to the Standard Time Temperature protocol required by BS476 parts 20 to 23 (also known as ISO834-1, EN1363-1 or in America & Canada ASTM E119-75).

Contrastingly, Fire Resistant cable test standards BS 6387CWZ, BS8343-2, BSEN 50200, BS8491 require cables to be tested to standards which have lower final temperatures (than required by BS476 pts 20 to 23) and in 'flame' rather than 'fire' conditions.

Given Fire Resistant cables are likely to be exposed in the same fire and are needed to ensure that all Life Safety and Fire Fighting systems remain operational. Fire resistant cables are specified to ensure life critical circuits remain functional in a fire. Emergency lighting & power for alarms, sprinkler systems, communication / evacuation systems, ventilation systems etc MUST remain functional until everybody is out alive. They should last at least as long if not longer than fire doors, windows and walls etc.

Cables are installed by many different trades for many different applications, what is not often realized is that the many miles of cables and many tons of plastic polymers which make up the cable

insulation and jacketing may represent one of the biggest fixed fire loads (fuel source) in a building.

The common argument that other organic / burnable materials in the building are greater is pointless as only electric cable has the real potential for all three basic requirements needed for a fire:

- Fuel source – materials used
- Air around the cable
- Ignition source – spark from outside cable or short circuit inside

There are two ways a polymeric cable can burn:

- External heat / fire
- Internal heat (overload / short circuit)

Common tests to evaluate flame propagation on cables are:

- IEC 60332-1 BS 4066-1 USA: UL1581, UL2556-pt 9.1, 9.3, 9.4 & NFPA 262
- IEC 60332-3 BS 4066-3 AS/NZS 1660-5.1 USA: UL1666, UL 1685, UL2556- pt 9.6 & IEEE 383

External heat/fire

All these test are conducted on cables starting at ambient temperature but in practice they will be likely be at operating temperature 60, 70 or 90°C (if cables were tested preconditioned at operating temperature many would fail !)

Internal heat

There are "NO" flame propagation tests done or required by any Standard or AHJ for cables under short circuit or overload ! (given that reports by Fire Authorities often cite cables as the source of many fires this oversight is concerning !)

Note: once the fire reaches flashover temperatures 300°C to 400°C – all polymeric cables burn

At present all tests on cables are done with flames on outside of the cable. This is only part of the danger and risk to life.

The insulation materials used on conductors are often hydrocarbons, meaning they burn. This includes PVC, Polyethylene or XLPE, EPR etc. It is important to point out that another well know hydrocarbon is petrol!

As these materials are all oil based they all have a very high fuel element, they all burn.

In overload or short circuit the heat is on the inside – there does not need to be a fire for these cables to burn, as with the Address Hotel fire in Dubai this is often a cause of fire.

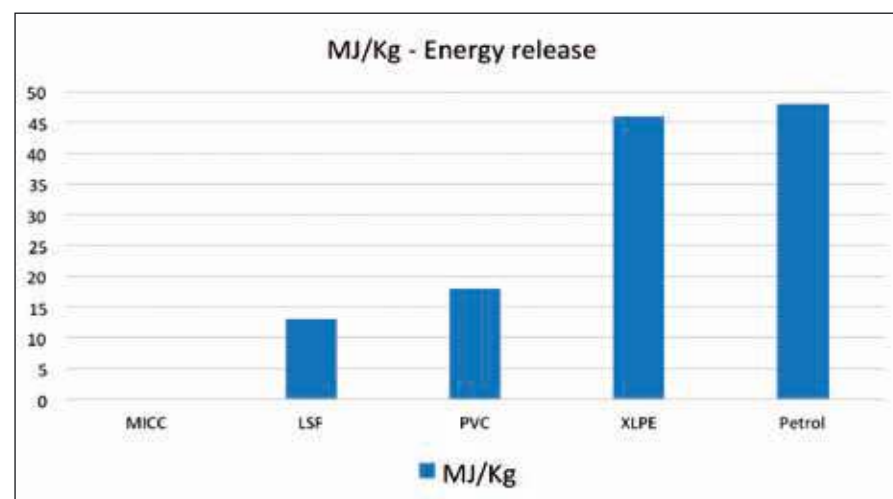
Why isn't there International tests on cables for fire due to overload / short circuit? The evidence suggests there should.

So there is smoke without fire... It is the low smoke myth

Many polymeric cable manufacturers claim the polymers they use for insulation and jackets are low smoke. They often

Material	Thickness (mm)	Maximum Specific Optical Density (DM) Non Flaming	Flaming
Plastics:			
UPVC	3	400	580
Polyethylene	3	590	83
FR Polyethylene	3	790	780
Polypropylene	3	550	162
FR Polypropylene	3	820	600
Polystyrene	3	476	960
PMMA	3	63	117
Plasticised PVC	0.75	430	650

Cable Material	Halogen	Flame Retardant	MJ/kg
MICC / MIMS / Pyro (Bare)	No	Yes	0
Teflon / PTFE	Yes	Yes	5
HFFR / LSF Materials	No	Yes	13
Tefzel / ETFE	Yes	Yes	13.8
Silicone Rubber SI	No	No	15.5
Polyvinyl Chloride PVC	Yes	Yes	18
Wood	No	No	18.5
Neoprene Rubber PCP	Yes	Yes	24
Coal			25
Polypropylene PP			46
PE and XLPE			46
Petrol			48



justify this by claiming compliance to tests like BS EN 61034.

These smoke obscuration tests are dependent on a specific sample weight of cable burned in a specific room / air volume.

These results are not predictive end use simulations. (Smoke generation can be greater on high heating before flame and smoke volume is directly related to amount of material burnt)

The current test is a 3m cube test with a flame, however as discussed polymeric cables burn much easier from the inside so most smoke is actually given off before

a fire, this heating up causes a large amount of smoke to be released.

Major incidents like in the Singapore and Washington DC Metro systems, along with exploding manhole covers in London a few years ago and more recently the huge fire at the Address Hotel in Dubai on New Year's Eve have all led to large evacuations due to great smoke release from polymeric cables.... All these caused by cable short circuits.

How can a BS-EN 61034 low smoke cable give off so much smoke?

PVC gives off more smoke in flame but PE

/ XLPE (polyethylene) gives off more smoke on heating without flame!

Plasticized UPVC is used to make general electric cable. In flaming and none flaming mode both feature high smoke outputs, indeed very bad as a fire proof cable...

Many leading fire resistant cable brands use polyethylene – In a direct flame it indeed shows as low smoke generation factor.... But under overload, short circuit or internal heat for any reason... 590DM is a huge amount of smoke.

It doesn't take an actual fire to cause an emergency evacuation, smoke with no fire is more common, extremely costly not to mention a major risk to life!

Whilst provocative this is again factual information. The heat given off if directly proportional to oxygen consumed;

Petrol = 48 mega joules – We know how well it burns, that's a lot of heat!

PE & XLPE = 46 – A very common cable insulation that shockingly releases almost as much heat as petrol!

If we consider how many tons of XLPE is currently specified and used in today's buildings it's not hard to acknowledge that they represent the biggest fire load.

Of course this burning up of the oxygen produces a ton of carbon monoxide too!

95% of deaths in fires are from carbon monoxide poisoning.

In summary

Current international standards for fire performance cables must be considered as only bare minimum performance standards in a controlled environment. There is no guarantee of the performance given in real-world scenarios, especially cables only to pass flame based standards.

It is therefore recommended for end-users, consultants and other industry experts to review any specific requirement for fire rated cables thoroughly and specify a solution that will give the required real-world performance. Whilst carefully considering ways to reduce the overall risk of fire and its effects on the occupants in the building.

By taking the holistic approach to fire safety we can help improve the safety of our buildings and ultimately contribute to saving lives.

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bre

Drive down false alarms – consider new technology

Throughout the world there's a problem with false alarms from automatic fire detection systems. In the UK this problem has come further under the spotlight because of the Localism Bill which, with some caveats, gives Fire and Rescue Authorities the right to charge for attendance. Indeed, London Fire Brigade announced in January 2014 that it was to start charging businesses for call outs if they attend more than ten false alarms in a twelve month period. They issued 100+ invoices within the first 120 days of the new regime!



Graham Simons

However, it's not all bad news with false alarms as official UK government figures show that there has been a steady decline in false alarm numbers over the past ten years and this against the background of ever more systems being installed. Nevertheless, everybody agrees that false alarms are a total waste of the Fire & Rescue Services' and the users' time, let alone the money that is involved.

The false alarms problem is further compounded by the absence of a single automatic fire alarm (AFA) Fire & Rescue Service attendance policy in England. This lack of consistency makes it difficult for both end users and fire alarm maintenance companies, whereas in Scotland there is one policy and this has been further reinforced by the setting up of a single fire

service. Currently in England only one Shire Fire & Rescue Service attends all AFA signals and that's Buckinghamshire. Check your fire risk assessment and consult your local fire service if you live anywhere else in England.

Another area of concern is the Weston-Super-Mare Grand Pier fire, where the judgment is certainly of interest to the alarm receiving centre industry. In this case, the judge recommended a 'default rule' of calling the Fire & Rescue Service even if the automatic fire alarm signal cannot be confirmed. However, due to the Localism Act, there could be the situation where the Fire & Rescue Service is threatening to charge for a false call and, in extreme cases, take the caller to court!

In view of the continuing false alarm situation the Fire Sector Federation

Technology Workstream has brought together a group of stakeholders, including the FIA, to look at the problem in general and its remit is:

- Clearly identify the problem; look at the data and accurately determine the cause of false alarms
- Look at what technology is available to provide reliable fire detection
- Having proved that improvements can be economically made to the fire alarm system, then set about changing the way fire detection is used in the built environment

Once the possible causes for false alarms have been established, the next step is to find ways of using technology to help solve the problem. In order to do this it will be necessary to identify problem sites and to bring the relevant technology, such as recent systems software / hardware updates, to bear.

A major key to success will be the management of the site and the commitment of occupiers to change what happens in their building. The possibility of Fire & Rescue Services charging may help focus management's attention here. One idea being promoted by some is that this could be enhanced further if these false alarm charges could be diverted into efforts to reduce the false alarms on a site.

Techniques that can be utilised include on-site filtering; fire warden investigation; multi-sensor fire detectors and perhaps the linking of systems (fire and intruder). Multi-sensors for example, can overcome many issues including hotel shower steam, burnt toast, exhaust in a loading bay and even cigarettes in prisons. The added benefit with multi-sensor fire detectors is that if something changes in the monitored area, the sensor can often be re-programmed to suit the new scenario.

The use of a delay to allow investigation by a fire warden before activation of the general fire alarm can be effective at reducing unwanted alarms. A staff alarm is used to filter these unwanted alarms. In this case following an alarm from an automatic fire detector the general alarm signal is delayed and initially only certain trained staff in the premises are alerted to permit investigation prior to evacuation. Note however that in residential care premises a staff alarm should not incorporate any delay in summoning of the



fire and rescue service. Manual call points (MCPs) are configured to override this delay and provide the general alarm. This could also be overridden by coincidence detection. This is when a second detector confirms the fire signal and activated the alarm. Finally if the fire warden fails to arrive within an acceptable time the system will automatically revert to fire alarm condition. In all cases it is important that if the event was an unwanted alarm this is fully investigated and documented and action is taken to prevent a repeat of this type of incident.

A recent study by BRE in conjunction with the FIA looked at 65 fire call out events in Glasgow. This showed that a surprising number of unwanted alarms were caused by the activation of MCPs. To avoid this problem the use of a cover that needs to be lifted before operation of the break glass can be a good solution. Similarly in busy corridors where trollies can sometimes impact MCPs deflector cover plates are available to protect the MCP from damage.

But where do we go next? Today's fire panels can provide the address data from a detector that has triggered. This could be sent to the fire appliance while on its way to the call. There is also the possibility of linking detection points, e.g. the system may have one point in alarm and two others showing a rapid temperature increase.

All this will cost money to implement but just think how much could be saved



year on year without all of the false alarm call outs.

In order to drive down the number of false alarms, all involved in our industry need to change and come together for a common good, for example:

- Builders need to fit what is suitable for the building rather than the absolute minimum
- Installers need to ensure that they understand the building and how it will be used
- Manufacturers need to develop simple ways to set up and, if required, change the system's detection parameters
- Users need to understand what they have fitted, how to best use it and the requirement to change as their business changes
- Legislators need to understand that calling for the absolute minimum may not be the most cost effective in the long term

And last but not least Fire & Rescue Services need to understand where they fit into the sector.

 **For more information, go to**
www.fia.uk.com



Graham Simons is FIA
Technical Manager.

NITTAN

Intersec 2017 Profile & Showcase

The final countdown to Intersec 2017 has begun, the world's leading trade fair for security, safety, and fire protection, which is scheduled to be ten per cent larger year-on-year when it opens from 22-24 January at the Dubai International Convention and Exhibition Centre.

The 19th edition of the annual three-day event will feature more than 1,300 exhibitors from 52 countries, while over 31,000 visitors from 128 countries are expected to attend as they seek the latest solutions across seven show sections of Commercial Security, Fire & Rescue, Safety & Health, Homeland Security & Policing, Perimeter & Physical Security, Information Security, and Smart Home & Building Automation.

Ahmed Pauwels, CEO of Messe Frankfurt Middle East, the organiser of Intersec, said: "Middle East organisations and end-users realise the impact of security and fire safety on their overall productivity and bottom lines, while regional governments have always been committed to protecting critical assets and people in the face of perceived threats along with social and commercial interests.

"In this respect, the region has carved out a niche for itself the global security, safety, and fire protection industries and Intersec, as the leading global trade platform with a pronounced regional focus, remains the natural vehicle for international manufacturers to showcase their wares to regional buyers.

"The coming edition will be even wider in scope and reach and will provide trade visitors a comprehensive look at what's available to suit their varied needs, whether that be for governments and authorities, or for private sector end-users in aviation, oil & gas, construction, finance, hospitality, logistics, retail or healthcare," added Pauwels.

With more than 580 exhibitors, Commercial Security is the largest section at Intersec 2017, with more than two-thirds of the world's top 50 security solutions players on board, including Hikvision, Bosch, Dahua, Assa Abloy, Tyco, FLIR, Hanwha Techwin, Axis Communications, Avigilon Panasonic,

Infinova, IDIS, and Milestone Systems.

With more than 50 exhibitors, Information Security has been one of the major growth sections at Intersec, and has doubled in size every year since it was first introduced to the show in 2014, as security threats to businesses spread beyond the physical realm.

Headline exhibitors confirming their participation early next year include Agility Grid, Al-Mazroui – ICAS, Commend, Dell, Easy World, Hanvon, Infosec, Matrix, Netronics, Quantum IT, and Rittal, a manufacturer of IT networking and Data Centre Physical Infrastructure solutions.

Smart Home & Building Automation is the most recent show section added to Intersec's vast product scope, as urbanisation and a new age of ICT (Information and communications technology) aids the march toward smarter integration of different functions like electro-mechanical controls, fire and safety security systems, and energy management.

Fire & Rescue (400 exhibitors), Safety & Health (100 exhibitors), Homeland Security & Policing (100 exhibitors), and Perimeter & Physical Security (50 exhibitors) wrap up the dedicated show sections at Intersec 2017, firmly underlining its position as world's most influential exhibition dedicated to security, safety and fire protection.

The show's strong international flavour will be further enhanced by 14 country pavilions from Canada, China, Czech Republic, France, Germany, Hong Kong, India, Italy, Korea, Pakistan, Singapore, Taiwan, UK, and USA.

Returning features to Intersec 2017 include the Safety Design in Buildings Pavilion in the Fire & Rescue section, which has doubled in size and will shine the light on fire-rated building materials such as facades, fabrics, doors, windows, paints, stucco, and egress systems.

A Techtextil Pavilion in the Safety & Health section will also present the entire spectrum of technical textiles and nonwovens for professional and protective clothing, as well as the latest laminating technologies for coating, printing, finishing and other products and services; and three industry conferences held in cooperation with the Dubai Police and Dubai Civil Defence wrap up the host of additional features.

Intersec 2017 is held under the patronage of His Highness Sheikh Mansoor bin Mohammed bin Rashid Al Maktoum, and officially supported by Dubai Police, the Dubai Civil Defence, and Dubai Police Academy.

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Stand S3-E09

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Stand 4-F24

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available mean Advanced fire systems can go further and do more. Panels are available from single-loop to eight-loop versions and networks can support up to 200 panels and millions of cause and effect options.

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www.advancedco.com



Apollo

Stand 4-E09

Apollo Fire Detectors will showcase the Apollo SOTERIA® range, which uses the latest in innovative technology to help eliminate some of the main causes of false alarms, as well as offering increased reliability

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of efficiency and significantly more loop power. The new protocol builds on the established capabilities of XP95 and Discovery; with forward and backwards compatibility and the ability to manage a significantly increased number of devices.

Event attendees will also have the opportunity to see the Apollo UL-approved specialist range of detectors – including marine and intrinsically safe (IS) devices – as well as products from two of the Apollo panel partners in the region.

Speaking about the event,

Ed Browning, Sales & Marketing Director EMEA for Apollo, said: "Intersec is a very important platform for us to showcase our products and business offering in the GCC region. Since last year's event we have extended our operations in the region, with a new regional office opened in Dubai and a new Regional Sales Manager to be able to service and assist our customers more directly. We look forward to continuing to grow our operations in this region."

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Baldwin Boxall

Stand 4-G12

Baldwin Boxall looks forward to welcoming visitors at its stand at Intersec Dubai in January 2017. This is always a busy show for the company and staff on the stand expect to see many new



faces, as well as catching up with existing contacts too.

Visitors to the stand will see the EN54 (LPCB) certified VIGIL voice evacuation system and the company's Omnicare EVC system and disabled toilet alarms. These products, as you would expect from Baldwin Boxall, have an undeniable reputation of being robust and exceptionally reliable. The company has recently gained Civil Defence Approval in the Middle East.

Baldwin Boxall is a British designer and manufacturer

and prides itself, not only on the quality of design and build of its products, but also on its customer service and support – which directors and staff believe is paramount to their success. Customer testimonials and long-term customer relationships prove this to be the case.

Nick Baldwin (Marketing Manager) and Nigel Bateman (Export Sales) will be on the stand and look forward to meeting you.

www.baldwinboxall.co.uk



BIOex

Stand 4-E24

Since 1998, BIOex designs and manufactures the latest generation of ecological foam concentrates and also proposes conventional foams for use in firefighting (Solid class A fires, Liquid class B Hydrocarbon fires, Liquid class B Polar solvent fires, Toxic gaseous vapors).

2002: At BIOex we were convinced of the harmfulness of fluorine derivatives and were already working to preserve our environment by launching ECOPOL, the first fluorine-free multi-purpose foam concentrate. End of 2015: We launch

the new formula ECOPOL F3 HC specially developed to create the first fluorine-free 3% foam concentrate with an exceptionally fast extinguishing action on hydrocarbon fires.

Ecological:

- Fluorine-free 3% foam concentrate
- Readily biodegradable

Exceptional

Performance:

- Used at 3% in direct application on hydrocarbon fires

- Obtained the best 1A performance classification under EN 1568-3 standard by an independent recognized laboratory (certified 1A/fresh water - 1A/sea water)
- Obtained the best performance classification under LASTFIRE – Good-Good-Good

Effective On Hydrocarbon Fires:

- Exceptionally fast extinguishing action on hydrocarbon fires
- Very long burn back time.

Powerful Foaming Capability:

- Offers durable adherence on vertical surfaces
- Insulates of storage containers in case of fire nearby.

www.bio-ex.com



Dafo Fomtec

Stand 3-G39

Dafo Fomtec is an independent Swedish manufacturer of fire fighting foam concentrates



and foam equipment. Dafo Fomtec is a global supplier with customers on all continents and in all market sectors. Our products can be found in use in petrochemical plants, airports, armed forces, ports, offshore, civil defence and many other sectors in over 50 countries. Our global business is supported by a wide range of international approvals such as UL, FM, EN 1568, ICAO, IMO and MED.

Fire fighting foam

Dafo Fomtec develops

and manufactures the following complete range of fire fighting foams:

- Aqueous film-forming foam (AFFF)
- Alcohol-resistant aqueous film forming foam (ARCAFFF)
- Fluorine-free foams (Enviro)
- High expansion foam
- Class A (wildfire / forest fire foam)
- Film forming fluoro protein (FFFP)
- Alcohol-resistant aqueous film forming fluoro protein (ARCAFFF)

- Fluoro protein foam (FP)
- Protein foam (P)

Fire fighting foam equipment

- Dafo Fomtec's range of foam equipment covers the following main product groups:
- Nozzles and branchpipes
- Monitors
- Bladdertanks
- Proportioners and proportioning systems
- High expansion generators
- Storage tank protection

www.fomtec.com



Fire Pump Controllers

with **viZi** technology



Over the past 30 years we have gained our customers' trust by supplying quality, innovative and reliable products that are supported by outstanding service. Our products have proven to be reliable property loss equipment in mechanical rooms worldwide.

We are proud to introduce our specialty products that will compliment your fire pump system requirements

UL Listed Disconnecting Device for UL Listed and FM Approved Electric Fire Pump Applications

The Model OPD completely removes/isolates power from the fire pump controller, allowing service work to be conducted without the use of personal protective equipment (PPE) due to the risk of arc flash.



Model DSM: Fuel Fill Station Monitor for Diesel Fire Pump Applications

The Model DSM fuel fill station monitor for diesel fire pump applications serves as a "Stop Fill" visual and audible annunciator. This monitoring panel avoids messy fuel spills by notifying the operator when to stop filling the diesel fuel tank.

For more information please visit www.tornatech.com

Detector testers

Stand 4-F38

Detector testers, the world's leading designer and manufacturer of detector test equipment, are set to present their largest ever product portfolio at Intersec – including an exciting new addition.

The Solo product range, built around the familiar red access poles and enabling testing of smoke, heat and CO detectors, has recently celebrated its 20th anniversary. During this time it has become famous world-wide and become the fire industry's most popular solution for functional testing of detectors.

2017 sees the launch of the next generation of Solo, designed to support the existing products in the range and build further on the unrivalled reputation the brand has developed. A preview of this next generation will be presented for the first time at Intersec.

In addition to products from the Solo range, the company's stand will also feature Testifire – the all in one test solution for smoke, heat and CO. As an all-in-one tester, Testifire continues to offer productivity benefits and a wide range of

unique features to users world-wide. Detector testers will also be presenting Scorpion, the solution for testing hard-to-access smoke detectors and aspirating smoke detection systems. Case studies from various sites including universities, hospitals and retail outlets will be available – all of which have benefited from having Scorpion installed in areas such as lift shaft, warehouses and secure rooms.

The Detector testers stand will once again form part of the UK Pavilion, with Martin Dibble

and Alex Brown in attendance. Visit the stand to learn more about all the company's products and availability.

www.detektortesters.com



FFE Ltd

Stand 4-F32

FFE Ltd is a UK based, global design and manufacturing business, dedicated to supplying specialist detection products to the fire industry.

FFE will be exhibiting the

latest in wide-area smoke and flame detection.

The Fireray range of Beam Smoke Detectors will be on display, including the new Fireray 3000 end-to-end detector with patented light

cancellation technology; the Fireray 5000 motorised auto-aligning reflective; the Fireray 50/100 reflective; and the NEW Exd, explosion proof beam detector. Fireray detectors hold UL and FM approval, and comply with the CPR for European CE marking. Fireray detectors offer more simplified wiring, installation and maintenance than any other beam detector.

The Talentum flame detectors are used when fast-acting and highly accurate fire detection is essential.

Using infra-red (IR) sensing technology, they can detect flames from all fuel types – from hydrocarbon fires with 4.3µm emissions through to invisible hydrogen fires – and can even detect flames through dust, steam and smoke. They are also immune to the effects of wind.

To find out more about these technologies be sure to visit FFE's booth, located in the UK pavilion, where industry experts will be on hand to answer any questions you may have.

www.ffeuk.com



FirePro

Stand 2-H24

FirePro manufactures, distributes and markets state-of-the-art environmentally friendly fire extinguishing systems worldwide. The modular, pre-engineered FirePro units efficiently and effectively protect conventional, as well as, specially-designed projects.

FirePro's environmentally friendly fire suppression systems employ the patented FirePro Compound (FPC) technology that is itself the result of intensive and extensive R&D. In our efforts to contribute towards humanity's

sustainability development goals, we have focused on Green Technologies. Our products are manufactured from environmentally friendly materials that at the end of their useful lifetime can be re-cycled or re-used without waste.

Laboratory tests consistently demonstrate that the FirePro FPC has no harmful effects on water, air, climatic conditions, animals, plants or micro-organisms. FirePro has proven that it is possible to protect lives and assets while caring for the environment and a

sustainable future for humanity.

Moreover, FirePro complies and constantly seeks to be in line with the most respected national and international certificates, approvals and test regimes in the fire suppression industry. The systems are tested and certified according to the most stringent international standards and requirements in both EU and the US.

Over the last two decades, FirePro has built a Partners Network extending to more than 80 countries across the globe and it is currently

commissioned to safeguard key assets for a portfolio of prestigious customers, in more than 110 countries.

www.firepro.com



Geofire

Stand 4-F34

Geofire will be showcasing its fire door holding and closing devices at Intersec for the first time this year.



With over 40 years of experience in the design and manufacture of electromagnetic fire door holders and closers, Geofire will showcase its hard-wired and wire-free solutions in Dubai.

Geofire's traditional hard-wired range of fire door devices are used all over the world and are ideal for new builds, as they are wired into the control panel and connected to the building's fire detection system.

The company's Agrippa range of wire-free, fire door holding and closing devices

offer an alternative, battery-powered solution. The devices 'listen and learn' the sound of a building's fire alarm, closing the door upon hearing the exact pre-recorded sound of the alarm.

The devices are easily installed at the top of the fire door to hold the door open, easing access and increasing

ventilation, without disruption to the fabric of the building. The fire door closers allow the door to be open in any position. If the fire alarm sounds, the holder or closer will release the fire door preventing the spread of smoke and flames.

www.geofire.co.uk



HAES

Stand 4-E37

From the land to the sea, Haes has you covered with a leading range of fire detection and alarm products which are manufactured in the UK and used worldwide. We deliver integrated solutions for clients of all type and size, manufacturing our own renowned range of control and indicating equipment, power supplies, relays and other peripherals.

Haes are proud of their growing reputation for delivering innovative solutions to combat issues in different situations. This flexibility and

forward thinking recently led to the development of the Esento range of networkable conventional control panels which are now being used to tackle projects across the globe.

Our Esento Marine range has been exclusively developed to address the issues of limited form and function in the conventional panels market for use at sea. Designed with the severity of the potential situation in mind, these new panels are equipped with programmable delays to outputs which allow time for an investigation before

invoking a full evacuation or muster alarm.

Haes is ISO9001 certified with additional industry and product accreditations from bodies including BAFE, LPCB, BSI, MED, Lloyds Register & ABS. With over 40 years experience in the fire detection industry, the team are focused on helping installers and planners to choose, install and manage fire alarm systems.

Our team of designers, engineers and production specialists constantly innovate the latest

fire detection technology, backed by dedicated customer advisers that are on-hand to provide support and guidance.

www.haes-systems.co.uk



Kentec

Stand 3-H24

Kentec Electronics, one of the world's leading independent fire control panel designers and manufacturers, is set to 'dazzle' visitors to Intersec 2017 with their extensive EN, UL & FM, Marine, Analogue, Conventional & Extinguishant ranges of Fire Control Panel Solutions. Life Safety System Specialists Kentec will be featuring their market-leading Syncro and Sigma ranges – designed for the widest, most demanding range of applications; plus a large selection of Kentec's extensive EN, UL & FM, Marine Fire Control Panel ranges. There

will also be live demonstrations of the company's all-new Taktis range of fire alarm control equipment, which combines the very latest hardware and software to produce a control and indication system, which is powerful and sophisticated, yet simple to use and understand.

The flexibility of the Taktis platform means that it can be re-configured to realize many other control and indication applications, with direct integration into intelligent buildings.

www.kentec.co.uk



Nittan

Stand **3-F38**

Nittan, a leading global fire protection company will exhibit for the first time at Intersec Dubai 2017 to promote its complete systems solutions, following the recent launch of its evo+ and evolution 1 fire alarm control panels.

Nittan's fire alarm control panels are fully compliant with BS EN54 parts 2 and 4, plus the evo+ range is approved to EN54 part 13 which is the European compatibility assessment of system components i.e. "Systems" Standard". Both ranges have been designed

with a host of features for maximum end user flexibility plus ease of installation and system set up, both the evolution 1 and evo+ ranges are compatible with the full range of Nittan Evolution analogue addressable fire detection.

Nittan's premium Evolution device range will take pride of place on the stand, combining truly exceptional and reliable fire detection with patented award winning Dual optical technology offering a very high degree of protection against unwanted false alarms. The

range features Analogue Addressable detectors, with up to 254 addresses per loop as well as a full range of Analogue Addressable accessories and Conventional devices.

Nittan is also pleased to be promoting its UL Panel and full range of UL fire detection devices for the first time, clearly demonstrating its truly international capabilities.

The Nittan Group has been at the forefront of the international fire protection industry since 1954. It continuously innovates and

strives for exceptional quality products of the highest standards.

www.nittan.co.uk



Patol

Stand **4-F35**

Patol Ltd are a privately owned British Company that manufacture and supply a range of fire detection products suitable for industrial and commercial applications.

Linear Heat Detection Cable

Patol's Linear Heat Detection Cable (LHDC) is designed to provide early detection of fires or overheating in Industrial and Commercial applications such as Car Parks, Freezers, Warehouses and Petrochemical Storage Tanks. LHDC is not adversely affected by water

or dust and can be installed in most environmental conditions. Patol manufacture LHDC in a range of alarm temperatures and different technologies and is available as Digital and Analogue. LHDC is also suitable for use in 'Hazardous' areas with I.S. barriers.

Infrared Transit Heat Sensors

Patol manufacture early warning Transit Heat sensors designed to detect 'black body' emissions travelling on conveyor systems at speeds of 0.5 to 6m/s. The sensors are supplied with a

selectable sensitivity and can detect temperatures as low as 100°C. The Sensors are solar blind and will ignore static heat sources.

www.patol.co.uk

PATOL

FIRE DETECTION SOLUTIONS

Reliable Automatic Sprinkler Co. Inc

Stand **7-A22**

The Reliable Automatic Sprinkler Company (RASCO) with twenty-three branches based all around the world, is one of the world's largest manufacturers and distributors of fire sprinkler equipment. Founded in 1920

by Frank J Fee, Reliable today, four generations on, is still under the leadership of the Fee family; manufacturing innovative devices which protect life and property from the effects of fire.

Sprinklers

Covering Dry or special application sprinklers to residential, Storage and Commercial sprinklers. Available in different colours, temperatures, response rates and deflectors- pendent, upright, conventional, horizontal and vertical sidewall. Available recessed or with custom cover plates.

Valves

Alarm, Dry, Low pressure, Deluge, Check and Pre-action valves. Available in different

sizes, end connections and pressure ratings.

System components

Reliable work closely with leading manufacturers worldwide to source and provide our customers with a complete range of products. These include RASCOFLEX flexible sprinkler hoses, CPVC pipe and fittings, RASCO branded Butterfly valves, OS&Y Gate valves, NRS and check valves, electrical equipment and much more.

www.reliablesprinkler.com

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Fireray® 5000 - The only laser aligned motorised beam smoke detector system available on the market

- Single person install - Laser allows for rapid alignment of detector onto the reflector
- Simple line-of-sight - Laser helps installer to quickly and accurately determine path of beam



THE MOST EXPERIENCED MANUFACTURER OF SPECIAL HAZARD FIRE PROTECTION SOLUTIONS



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+1 219-663-1600

www.janusfiresystems.com

Safety Technology International

Stand 3-H30

STI manufacture an extensive and unique range of fire, safety and security products designed to protect critically important lifesaving equipment from misuse.



Safety Technology International

New product alert! STI's new UL ReSet call point will be making its debut at this year's show. STI can now offer a global installation solution with the EN54 and the UL Listed Resettable Call Point range. Unique in their design, the call points mimic the feel of breaking glass whilst offering the user the benefits and environmental advantages of a resettable operating element. Once activated a quick turn of the key will reset the call point ready to use again – no broken parts to replace.

UL ReSet is available in a variety of colours, suitable for many applications.

Other products that will be on display is the renowned Stopper II, audible polycarbonate protective cover designed to retrofit over manual pull stations or call points. Globally recognised by authorities as an essential fire system component on sites where the risk of false alarms is high, for example education, health care and housing.

The polycarbonate range

also includes weatherproof enclosures, an ideal solution to extend the life and reliability of pull stations, call points and switches exposed to harsh environmental conditions such as water and sand.

Also within the Stopper Line are alarm devices for fire extinguishers and fire doors as well as a comprehensive range of protective heavy duty steel cages, push buttons and key switches.

www.sti-europe.com

Thermarestor

Stand 3-G33

Technology Transforming Fire Safety – the risk of fire exists with almost everything that has an electrical source of supply – on average; there are 25,000 fires of an electrical origin each year in the UK. Unfortunately, the problem isn't just confined to the UK – it's global. Thermarestor is a unique and innovative way of preventing such fires. As a heat detection system for electrical connections and components it offers a pre-ignition solution to the problem. By permanently monitoring such points it can sense the presence of excessive

heat and provide early warning, in order to avoid a potential fire. Where the electrical supply is via an RCD (GFCI) it can automatically disconnect the supply and remove the source of ignition. As a fire prevention system, Thermarestor provides protection against electrical faults and overloads – wherever

they may occur within the electrical installation. It can be installed to new and existing installations, allowing thermal monitoring of incoming supplies, distribution boards, switchgear and accessories, such as socket outlets. Connection to existing fire alarm and building management systems

is simple and straightforward and provides a highly effective means of notifying occupants of any overheating conditions. This allows such incidents to be investigated as maintenance issues – avoiding the need for an emergency response.

www.thermarestor.co.uk



TLX Technologies

Stand 4-H16

TLX Technologies is excited to announce that our next generation supervised fire suppression actuator is now a UL recognized component to UL 864 for not only indoor dry but outdoor wet applications. TLX's supervised latching electric actuator meets required UL and NFPA wiring codes and standards and includes an internal supervisory mechanism that ensures the actuator is properly installed on the discharge valve of the extinguishing agent storage container. Integration of

the supervision mechanism eliminates the need for any additional components, connections and wire paths; resulting in a streamlined, NFPA compliant solution.

The supervised latching solenoid actuator comes standard with six wires. Two wires are used for activation and four are used for supervision of both the actuator placement as well as connection to the fire panel. Factory-wired leads fed through an integrated conduit port in the housing have been added to meet the UL and NFPA

wire codes required on all fire suppression actuators.

The supervision on the actuator allows for fully engaged installation detection to be configured to your exact needs. Rugged construction, ultra-fast response and the ability to be reset ensures reliable and outstanding performance over the actuator's entire 15-year life span. TLX's complete family of actuators and direct-acting solenoids for fire suppression systems meet the requirements of NFPA 2001 (Sec. 4.3.4.1), UL 2166, UL 2127 and FM 5600.

For over 16 years, TLX Technologies has worked with manufacturers to develop and manufacture custom actuators and valves to meet the challenging demands of active fire suppression systems.

www.tlxtech.com



Tornatech

Stand 5-B38

Based in Montreal, Canada since 1985, Tornatech specializes in the conception and manufacturing of fire pump controllers in accordance with the NFPA 20 standard, listed with UL and approved by FM. In addition, we have developed controllers that meet various local standards and approvals.

As the first manufacturer of fire pump controllers to incorporate touchscreen technology, we are pleased to announce the release of the ViZiTouch V2 color touchscreen operator interface with a 7.0i

inch color display with intuitive graphics, quick and easy commissioning, user-friendly operation and maintenance data logging capabilities. Mechanical features include a compact enclosure design, definite purpose disconnecting means and emergency start handle.

Regardless of the application, all Tornatech products provide our customers with an innovative solution. Our engineering team is continuously keeping up to date with the latest technologies available and developing tools for the future. We commit ourselves

to offering the best technical solution, superior quality and outstanding service.

Over the years, we have not only introduced innovative products but also developed a network of subsidiaries, sales offices and authorized service dealers located around the world to serve our customers better. We have manufacturing capabilities in Montreal, Canada, Wavre, Belgium and Dubai, U.A.E., a sales office in

Singapore as well as sales representatives in the U.S.A and Latin America. Today, our products are installed on 5 continents and in over 80 countries.

www.tornatech.com



Viking

Stand 3-B12

Viking will be showcasing a key selection of their comprehensive fire protection product portfolio. Be one of the first to learn about our new foam products and approvals and don't miss the opportunity to discuss the latest trends in water, foam, gas and detection systems with Viking EMEA's product managers.

Water:

- Water and dry ELO sprinklers
- Fireking products: gate valves, swing check valves, Y-strainers
- ProCon PCC cable protection

Foam:

- Bladder tank proportioning
- Various discharge devices
- Foam concentrates

Gas:

- Fire extinguishing systems: VSN 1230 & CPS 1230, both using Novec™ 1230 by 3M™; VSN 200, using FM200® by Chemours
- OneU - Protection systems for use in closed 19" racks
- CO2 high pressure

Detection:

- UniVario industrial detectors

- FMZ 5000 control panels
- Heat detection: thermographic camera

Viking is a dependable partner in fire protection with almost 100 years of experience and is part of the Minimax Viking Group employing around 8,000 people and boasting an annual turnover in the region of €1.4bn. In addition to the high quality fire protection technologies from Minimax Viking's research, development and manufacturing facilities in Europe, USA and Asia, Viking supplies complimentary

quality products from other manufacturers and partners. Installers, specifiers and users of fire protection systems are therefore able to access a full range of components for water, foam, detection and gas-based fire suppression systems. Excellent technical support and high levels of product availability complete our market leading service offering.

www.viking-emea.com



ZAPP-ZIMMERMANN

Stand 3-B15

ZAPP-ZIMMERMANN has been offering innovative fire safety systems for more than 25 years, specialising in the areas of cable, pipe and combination penetration seals, as well as fire safety joint seals.

In addition to our proven product line of intumescent moulded parts made of PU penetration seal foam, we also offer other construction materials, such as silicone and acrylic for civil engineering, tunnel construction, shipbuilding, and rail vehicles.

In the course of harmonising

fire safety in Europe, ZAPP-ZIMMERMANN GmbH tests its fire safety systems in accordance with the European test conditions to obtain a European Technical Approval.

5 years ago ZAPP-ZIMMERMANN started to test the successful firestop products according to the American standards ASTM E814 (UL 1479) to obtain UL classified firestop systems.

www.z-z.de



Time to build life safety into the fabric of smart city design?

“Smart cities” – urban developments that make use of cutting-edge communications technology to streamline the provision of services, such as education, transport and waste management – have been widely hailed around the world as the future of city planning. We spoke to Simon May, technical manager, Hochiki Europe, to explore what impact they will have on the life safety industry, and find out if the sector is ready to meet the design challenges smart cities pose.



Simon May

Thanks to the Internet of Things fast becoming a reality – made possible by the wide array of smart devices populating our workplaces and homes – the future vision of a city completely interconnected, with every conceivable service available at the touch of a button, has never seemed so achievable.

By incorporating cutting-edge information and communication technologies into their essential infrastructure, “smart cities” have the potential to streamline the provision of services, from transport and waste management, to education and leisure.

▼ 39% do not believe the industry is currently equipped to adapt to the technological demands of smart cities.

In doing so, they offer the potential to do more than boost the efficiency of public services, reduce waste and energy consumption. They give urban planners the ability to make cities even more liveable for the people inhabiting them, enhancing their health and wellbeing.

While this broad understanding of the smart city concept has been accepted universally, there is still considerable debate as to the extent to which an urban development can be considered “smart”. With more and more towns and cities around the world incorporating some elements of the smart city vision into their infrastructure, like active traffic management or streamlined emergency response, the concept is now raising more questions than answers, particularly when it comes to life safety.



Simon May is Technical Manager for Hochiki Europe.

Smart cities and life safety

Despite smart cities being a subject of intense debate across the construction industry and among policy makers for a number of years now, the life safety sector is only just beginning to scratch the surface of the possibilities they offer, and the challenges they pose.

It has always been imperative for buildings and cities to be designed with the security of residents in mind. However, with the fundamental fabric of the urban environment changing to implement the smart city concept, the life safety industry now needs to explore in depth what is required of it to keep people safe into the future. Crucially, it's time to ask whether the sector is ready to meet the demands of highly connected smart cities.

According to a recent study of life safety professionals across EMEA and India carried out by Hochiki Europe for its new report on smart cities, there is currently a significant gap in understanding of what smart cities are and their potential impact on the industry. The survey – principally of installers – found that almost 60 per cent had never heard the term smart city before, and only a third knew what one was.

Despite this knowledge gap, only a small minority of respondents (14 per cent) were concerned about the future of the industry if smart cities become the norm. Some 30 per cent felt it would make no difference to the sector, and over two-fifths were not worried at all.

These figures suggest that installers and other industry professionals are confident that the sector has the ability to adapt quickly to changes in the construction landscape. This confidence becomes even more apparent with the responses to the question of whether professionals thought the industry would be able to keep people at least as safe in a smart city as in a standard development. Nearly half of respondents felt this would be the case, and almost a fifth thought residents would be safer.

However, when it came to considering the industry's ability to adapt to the technological demands of smart cities, respondents seemed less certain. While some 39 per cent thought the industry is not currently equipped

Sectors life safety installers think will be most impacted by smart technologies:



to adapt, as many as 36 per cent felt the sector is more than capable of meeting future requirements.

The results of this survey serve to illuminate the gap between the confidence of life safety professionals in the future of the industry, and an understanding of how the sector can adapt.

As an industry, it is evident that more research is required to understand the implications of smart cities on the sector and to determine what life safety will look like in the future. There is also a key role for manufacturers to play here in informing the rest of the industry about the range of life safety solutions already

available that can help meet existing smart city demands, as well as about how technology is already innovating to meet future challenges.

Life safety in the future

Modern life safety technology already allows all of the fire safety and emergency lighting equipment in a building to be controlled from a centralised control panel. In doing so, it enables facilities managers to monitor the performance of their entire network from a single location, saving them considerable time as they undertake the regular inspections mandated by law.



What is more, analogue addressable life safety technology can already pinpoint and report on the exact location of a fire within a structure. Combined with targeted fire suppression equipment, like sprinklers, such systems can play a major role in minimising the risk of a fire spreading and even prevent damage to intact property elsewhere in the building, reducing the overall financial impact to building owners.

With this in mind, it is clear that smart-city inspired technology can go a long way towards supporting innovative life safety systems to enable more effective fire safety delivery in the future. By gathering information from regular maintenance inspections and data about the location and source of past fire incidents, for example, it is possible to predict the fire risk in a particular development. This provides facilities managers with the knowledge they need to identify the most effective life safety technology for the needs of the building in their care.

By gathering enough information, it is possible to replicate this across a neighbourhood or even an entire city.

Gathering data about the fire risk for each development in a district, can help local authorities plan future fire and rescue service provision, from the allocation of funding, to the precise location of fire stations.

We are already seeing data collection being used by facilities managers to better understand the fire risk in their properties, thanks to Building Information Modelling (BIM). Using this design solution, architects are able to feed technical information about their chosen construction materials and life safety equipment into 3D computer aided design (CAD) models of the developments they are working on.

Incorporating this information into their blueprints, they can model how a fire, or even the smoke it generates, might travel through a building. Armed with this knowledge, they can then determine the fastest and safest escape routes for occupants. Once the building is completed, facilities managers can then use the BIM model to understand the fire resistance ratings of all the building materials used in the original construction phase, such as insulation

and flooring, as well as replacement products. This can help them ensure that every part of the premises continues to meet legislative requirements.

Time to engage with smart cities

Smart cities offer us considerable potential to improve living standards in towns and cities across the globe, while helping to minimise the consumption of limited natural resources. Much progress has been made to harness the power of smart city technology to boost energy efficiency, manage traffic and improve emergency service response in cities around the world, from Barcelona in Spain, to the new Lusail City development in Doha, Qatar.

It is clearly time though, for life safety provision to be included as a key component of the smart city concept, alongside sustainability and traffic management. This is a necessity to further improve the safety and wellbeing of residents, and to protect property, while streamlining costs and the use of limited resources.

Governments and life safety manufacturers need to cooperate to put the foundations in place for smart, life-safety focused cities. This means not only looking at the regulations surrounding fire safety, but also developing new technology to enhance the connectivity of fire safety and emergency lighting systems, and even laying the infrastructure needed to centralise control of life safety equipment. Working together in this way is crucial to ensure the vision of a smarter, safer urban landscape becomes a reality.



For more information, go to www.hochikieurope.com

FIREscape

Emergency Lighting System

- Simple Installation ✓
- Low Maintenance ✓
- Low Voltage ✓
- Intelligent ✓



Please visit the Hochiki stand at Intersec for a live demonstration of the system.

intersec

22-24 JANUARY 2017. DUBAI, UAE. STAND NUMBER: 3-F12

For more information please visit:
www.hochikieurope.com/firescape
 +44 (0)1634 260 133
lighting@hochikieurope.com

Maximising fire system effectiveness in historic buildings

Historic buildings pose a complex challenge for those tasked with protecting them from fire. The threat and consequences of fire in any building are serious. However, in the case of historic sites, the loss of irreplaceable artefacts of high monetary and historic value is permanent and costly to our heritage.



Aston Bowles

Added to this, these buildings frequently have permanent staff and attract high numbers of visitors, so life safety must be of paramount importance.

Finding the optimum balance between the protection of people and property and preservation of the aesthetics and authenticity of the building is contentious and will always require compromise.

▼ **Advanced MxPro panels** are installed in London's Natural History Museum.

Complying with regulations

The Regulatory Reform (Fire Safety) Order 2005 stipulates that all reasonable steps must be taken to keep buildings safe and protect the people using them. An in-depth fire risk assessment needs to be carried out and, in the case of historic buildings, normally needs to be supplemented with a more in-depth fire safety management plan. This should cover important factors such as active and passive protection measures – both in place and required – mitigation of identified risks, staff training and maintenance as well as review periods.



Aston Bowles is head of marketing at Advanced.

Choosing the right system

At the heart of the system will be a fire panel – single or multi-loop, standalone or networked – the choice available is wide but not simple. The installation costs are likely to dwarf equipment prices, so finding a system that is easily installed with flexible cabling and a range of communication options should be the priority.

The unique nature of heritage sites means they are likely to be connected to ARCs or are often in remote locations with difficult access. If a low quality, unreliable or unsuitable system is installed, the downstream costs of fault-finding, repair and maintenance can be significant.

Another important consideration when choosing panels for historic sites is the degree to which they allow you to subdivide and manage different building areas. The fire system should offer many, easily programmed cause and effect options to accommodate the wide range of room sizes, layouts and uses frequently found in heritage buildings.

A common panel challenge is to ensure that the system is made as unobtrusive as possible, without compromising performance. By using repeater panels, the larger more obvious primary fire panel can be hidden from view in an office or service room. More aesthetic and easily disguised repeater panels are now available, such as the Advanced TouchControl touchscreen on which images and public information can be displayed when not in fire mode. An alternative approach is to create bespoke cabinets and housings for panels, which can be tailored to fit seamlessly into almost any decorative scheme, or hard – to-access space.

Many factors can impact the performance of the fire system, and these are often exacerbated in historic buildings. Unusual room geometry, large windows, archways, draughty fireplaces and high, irregular, suspended or decorative ceilings can create detection challenges.

Discrete detection

BS5839 is the bible for detector placement and gives detailed guidance on the standards for different detection types in unusual spaces.

Particular care must be taken to ensure that smoke can reach detectors, and that it is not shielded from them. It is also



Image courtesy of Advanced

important to place detectors in such a way that smoke does not stratify beneath the detecting element or otherwise delay or stop the efficient detection of smoke. If we add in the nature of the fires that different materials will create and the likely speed of spread of fire in an old building, detection choice and system programming become critical.

There are many different detection methods suitable for historic buildings and it's common to find many of them across a single system. Modern point detectors are hugely reliable and the most common type is still the optical smoke detector, with heat detectors employed in spaces such as kitchens where steam and cooking smoke are often present. Multi-sensor detectors combine heat and smoke detection in a single unit, helping to ensure that a fire incident is real and avoiding false alarm incidents.

Because the floors and ceilings in older buildings tend to be wooden, fitting cable systems to approved modern standards can be a huge logistical challenge, as these usually require suspended steel trays. A much less invasive option involves using wireless detectors. The wireless receiver modules still need to be wired to the panel network, but the detectors themselves can be placed much more discreetly and they are available in virtually all the most common variants – smoke, heat, ionisation and multi sensors.

Wireless solutions not only mean lower visual and physical impact, they are also faster to install and so can help to keep costs down. Thanks to two-way

▲ **Touchscreen technology** allows users to pinpoint the location of a fire incident.

communication with the panel, battery replacement and fault reporting can be worked into the on-going maintenance schedule, which is particularly useful where a scaffold is required to reach specific components.

Where early warning is crucial, such as a gallery space or archive store, aspirating detectors offer a highly effective solution. These continually sample the air, several times a second, and can be set at various sensitivity levels. Although the associated pipework can be bulky and hard to conceal, they are still a viable option when located in less prominent spaces such as cellars, service areas and attics.

As smoke and heat detectors are unsuitable for ceiling heights over 10.5 metres, due to the way smoke dissipates in taller spaces, beam detectors can be used in larger rooms, such as great halls or chapels. These are simple to install and can function wirelessly. The need for a reflector on the other side of the room can make them sensitive to movement, particularly in timber-framed buildings, although some newer beams do self-align, minimising the effects of building movement.

Another option is video and CCD driven flame detectors, a technology that has developed rapidly in recent years. Although flames will often, although not always, be detected after smoke, these



▲ The historic Iona Abbey, in the Inner Hebrides, is protected by Advanced MxPro panels.

are useful devices where quickly visible flame fires are more likely.

A final detector type for sensitive installations is linear-heat or heat-sensing cable. This can be run through any area to provide early warning of a fire. Minute changes in temperature cause the conducting cables to short, thus identifying the location of the heat source and alerting the fire system. In London, the reconstructed Globe Theatre was able to get around a 400-year-old ban on thatched roofing using this system. The cables run through the thatch and connect directly to the fire panels, giving early indication of any incident.

Prioritised protection

Another key to effective fire safety is to ensure that critical and high risk areas, such as kitchens, boiler rooms or gallery spaces, are specified for a higher level of detection, using single or multiple detector types, so that incidents are confirmed as quickly as possible and action can be taken without any delay.

Fires can spread very quickly in historic buildings, so measures to allow quick extinguishing via sprinklers, water mist or, for high priority areas, suppressant gas or foam should be considered.

The intelligent zoning of fire systems

can be combined with automatic fire doors to isolate the fire and extinguish it, or at least keep it under control until the fire service arrives. This solution was used in the treasury at Lincoln Castle, home of a priceless copy of the Magna Carta, where an Advanced fire panel has been combined with an extinguishant control panel and fire suppression gas to protect the vault. Automatic door controls isolate the space, preventing the fire from spreading and ensuring that the gas is concentrated in the necessary area.

Escape routes longer than normally permitted are a frequent problem in historic properties, especially where they have a residential use, e.g. as hotels or apartments. Solutions are available, through cause and effect, to control the staged evacuation of the building, verify that the alert is genuine and, if necessary, signpost a safe escape route using intelligent emergency lighting systems. Automated paging systems are also useful in buildings of this type, and pagers with flashing lights or a vibrating function can ensure that occupants with visual or hearing impairment are made aware of a fire incident.

Human intervention

In all modern fire situations, human intervention is crucial to avoid false alarm incidents and oversee a successful evacuation. Given the added complications of historic sites, the role of onsite personnel can be even more vital

and good communication can make all the difference in averting disaster. Remote paging systems, such as the one used in London's Royal Albert Hall, can alert staff as soon as an incident occurs, giving them the chance to access the system on their handheld device or go to the nearest panel.

Once aware, staff can access the nearest fire panel or repeater to determine the nature and validity of the incident, before conducting an orderly evacuation as efficiently as possible. Where relevant, such as in the kitchen area of a residential unit, it's also possible to build in a short (30 second) delay for staff or trained residents to confirm the alert is genuine. This is just one example of how cause and effect programming can be useful.

Fire systems in historic buildings are often connected to an alarm receiving centre (ARC) to ensure the fire service is on site as soon as possible. Some require human confirmation of a fire and cloud monitoring means that key information can be accessed from any location using a PC or handheld device, which is particularly beneficial in locations where staff may be away from the source of the alert.

All staff should be trained to operate and monitor the fire system, with regular update sessions and fire drills to ensure the effectiveness of the procedures put in place. This is even more important in historic buildings, where evacuation routes are likely to be longer and more complex than in more modern premises. The monitoring and evacuation process can be further aided by custom interfaces, such as a 3D plan or map on a touchscreen panel, to help staff pinpoint and verify the fire incident.

In conclusion

Historic buildings have always presented a challenge for effective fire monitoring, detection and evaluation, but as with all fire systems, continual developments in the technology available have driven major improvements in this area.

A well-planned system can safeguard any historic site, as well as the people and treasures it contains, facilitating rapid evacuation and ensuring that fires are contained and extinguished as rapidly as possible.

➔ For more information, go to www.advancedco.com

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 **Advanced**

A 'flexible' solution to fire sprinkler safety

Traditional dry sprinklers have several challenges that threaten the reliability of the fire sprinkler systems they're installed in. These challenges pose issues for fire protection professionals, including the high frequency of freeze-up's within these life-safety systems and installation coordination challenges.



Thomas Savage

In Tom's work at Victaulic, he leads a global team developing and commercializing new technologies for flexible fittings, sprinklers and special hazards. Over the past 25 years, Tom has served in various research and development, sales and marketing roles at companies, such as W. L. Gore & Associates, Inc.

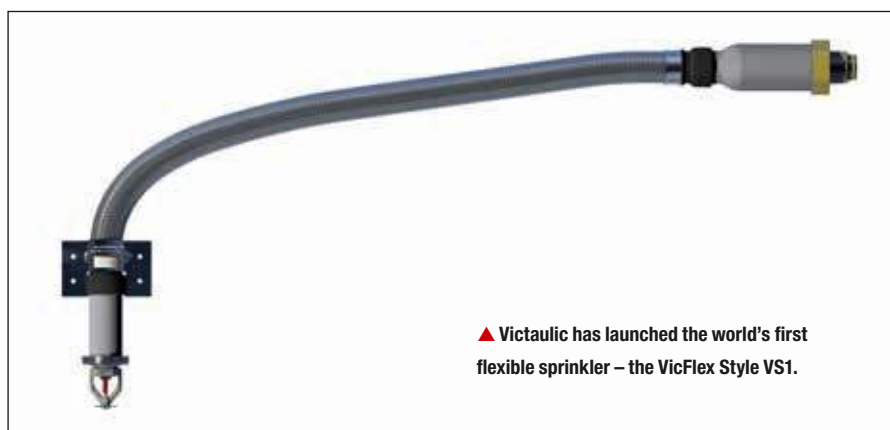
Since traditional dry sprinklers are rigid and can only be installed in a horizontal or vertical orientation, these design barriers historically have resulted in wet piping being run in or close to exterior building walls, increasing the possibility that the water in these pipes will freeze during winter months. When piping freezes, the entire sprinkler system must be shut down and drained before it can be repaired. As a result, downtime of the sprinkler system leaves buildings without a means of fire protection. This is especially crucial in multi-family apartment construction and in the parking areas and breezeways in those areas where sprinklers are exposed to freezing temperatures.

To eliminate such concerns in some areas, builders, designers and architects had no choice but to use soffits to ensure that water-filled sprinkler piping would remain in a conditioned space and above freezing temperatures. Building these soffits has unfortunately become a necessary burden, not only because they are unsightly, but also because they drastically limit the design process for architects. Soffits also require additional

labor and material expenses each time they need to be constructed or repaired, causing further inconvenience and racking up unnecessary costs.

Another solution to reduce the impact of freezing conditions on sprinkler systems is to use dry sprinkler piping with dry sprinklers. While eliminating the water-filled piping, dry sprinkler systems still present the installation challenges seen with traditional dry sprinklers. Inherent installation difficulties, such as complex and multiple measurements and coordination between different trades, can lead to measurement errors, multiple lead time delays and additional expenses – all of which will result in negative effects on a project's budget and timeline.

Recognizing the need for an improved dry sprinkler that increases the sprinkler length within the conditioned space and moves the water further from freezing conditions, Victaulic's team of expert engineers developed a simpler and safer alternative to traditional dry sprinklers. The solution is the VicFlex™ Dry Sprinkler Style VS1, the industry's first and only flexible dry sprinkler. The VicFlex™ Dry Sprinkler Style VS1's



▲ Victaulic has launched the world's first flexible sprinkler – the VicFlex Style VS1.

Image courtesy of Victaulic

patented design combines the industry-renowned VicFlex™ flexible fittings technology with Victaulic's historical dry sprinkler expertise to provide unprecedented adaptability in design and building applications.

With the product's unique design, installers can now bend the VicFlex™ Dry Sprinkler, allowing the sprinkler length to be longer and move the water farther from potential freezing conditions within the wall. The VicFlex™ Dry Sprinkler Style VS1's flexibility is due to its highly bendable braided construction, which provides 100-percent kink resistance, as well as a tight, 2-inch bend radius. These advanced product features enable the designer to seamlessly move the water farther into the heated spaces within buildings by flexing within the exterior wall or covered balcony and back into conditioned space. This flexible sprinkler design also reduces maintenance visits due to freeze-up's, and in turn, reduces the number of impaired systems, displaced tenants and repair work.

The standard three convenient lengths of the VicFlex™ Dry Sprinkler Style VS1 – 38", 50" and 58" – allow sprinkler system designers to meet or exceed the NFPA 13 Code requirements for dry sprinkler installations, providing peace-of-mind even in the most challenging of environments.

These standard, manufactured lengths also eliminate the need for customization and reduce the number of measurements and trips to the jobsites. In addition, with the VicFlex™ Dry Sprinkler Style VS1, the ability to order dry sprinklers off-the-shelf is a reality. The sprinkler contractor no longer has to wait weeks or months for dry sprinklers, and they can complete the job quicker.

Veteran sprinkler contractor David Satterfield of VSC Fire and Security and Raleigh Assistant Fire Marshal Steve Berry opted for the VicFlex™ Dry Sprinkler to ensure complete protection in a new, multi-family residential building in Raleigh, North Carolina.

When choosing a dry sprinkler solution for the balcony application, several requirements were considered, including the ability to meet NFPA 13 Code requirements for exposed sprinkler length, the aesthetics of eliminating soffits, as well as the reduction in trips to the job site. These installation and design



Image courtesy of Victaulic

challenges called for the world's first, and only, flexible dry sprinkler.

VSC Fire's Satterfield and Assistant Fire Marshal Berry were present for the install, along with representatives from Victaulic, and all were impressed with the installation speed and versatility of the VicFlex™ Dry Sprinkler Style VS1.

"Education and following NFPA code is key to keeping lives safe and property intact. Every dry sprinkler concern I've had in the past has been answered. It just makes sense," said Steve Berry.

To conceal the sprinkler heads from sight on the balconies and eliminate the need for soffits, the flexible dry sprinklers were installed in a pendent orientation. The team was most impressed with the distance that the wet pipe moved back

▲ Victaulic's VicFlex Style VS1 eliminates the need for soffits, providing flexibility in design for architects and engineers.

into the conditioned space, recognizing the increased safety factor of using the VicFlex™ Dry Sprinkler Style VS1.

Those tasked with upholding the safety of residents and tenants of their buildings, like Assistant Fire Marshal Berry, will now look to a flexible fire sprinkler solution to ensure reliability and uptime of fire sprinkler systems. With the VicFlex™ Dry Sprinkler, Victaulic has advanced the safety, convenience, and design flexibility of dry sprinklers.

For more information, go to www.victaulicfire.com

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Turning the building envelope into a fire prevention shield

The role and importance of active fire protection systems such as sprinklers is well known in most industrialized countries. However, the importance of fire-limiting construction for the entire building envelope is not as well understood. Complicating matters further are the exterior building components that often may be overlooked when it comes to fire and natural hazards loss prevention.



Jean-Philippe Roisin

The building envelope of commercial and industrial buildings is critical to limiting fire spread, minimizing fire-induced property damage and mitigating business interruption. The use of rigorously tested and certified products and adherence to loss prevention guidance derived from scientific research and field study are important steps in not only limiting such losses, but preventing them from ever occurring.

At commercial property insurer FM Global and company member FM Approvals, the deep belief – backed by research and nearly two centuries of property loss experience and testing – is that the majority of losses from natural and man-made causes can be prevented. Companies that choose to embrace this philosophy can benefit from the use of planning tools, performance-tested FM Approved products, and proven installation and maintenance guidelines from FM Global to create well-protected facilities with significantly reduced potential for property loss due to fire and other hazards. FM Approvals, which provides third-party certification of property loss prevention products, is the only organization in the world that assesses performance of complete wall assemblies when subjected to multiple perils, including fire (interior, exterior and any wall cavity), wind, hail and windborne debris.

This article provides a brief overview of how performance-tested and certified building envelope products and assemblies can prevent or significantly reduce losses to commercial and industrial buildings.

Engineering the building envelope

The critical components that comprise the protective shell or building envelope for a “typical” industrial or commercial building are shown in Figure 1. From a loss prevention perspective, the building envelope is the outer shell that protects the interior from fire and natural hazards such as excessive heat/cold, moisture, wind, hail and snow /ice. The basic building envelope usually includes the following:

- **Roofing Assemblies** (e.g., decking, insulation, fastening system, membrane, flashing),
- **Roof-mounted Systems** (e.g., cooling towers, photovoltaic panels).
- **Exterior Wall Assemblies** (e.g., solid walls, cavity walls)
- **Fenestrations** (e.g., windows, doors, skylights, shutters)

Roofing Assemblies

Roofing assemblies are perhaps the most important first line of defense against fire and natural hazards in the complete building envelope. They must be able to protect a structure from natural hazards, including rain, hail, snow, high winds and temperature extremes. They are also required to limit fire spread from external fire risks (e.g., flying embers from adjacent buildings, rooftop hot work) and from internal fire risks (e.g., presence of combustible materials, failure of electrical or mechanical equipment).

Roof components that have been tested individually, but not as a total system, should not be relied upon to provide the highest level of fire and natural hazards protection; rather, roof assemblies that have been tested and certified as complete systems should be considered. Assembly testing should include multiple perils such as fire

Jean-Philippe Roisin is Assistant Vice President, Manager New Business EMEA for FM Approvals based Paris.

testing above and below the deck, wind-uplift testing, hail-damage testing, accelerated weathering, water leakage, foot traffic and corrosion-resistance testing of metal parts.

Roof-Mounted Systems

Cooling towers and photovoltaic systems are often mounted on roofs of commercial and industrial buildings to save footprint space and take advantage of the elevated location. All can, and do, contribute to increased fire risk.

Cooling towers are widely thought to be safe from fire because water flows through them. In fact, cooling towers are vulnerable to fire as they contain dry areas, electrical equipment and one or more combustible materials such as PVC, fiberglass reinforced plastic and ABS. Fire risks are increased during regular maintenance as water flow may be turned off allowing hot work, human element issues or electrical arcing to potentially trigger fires.

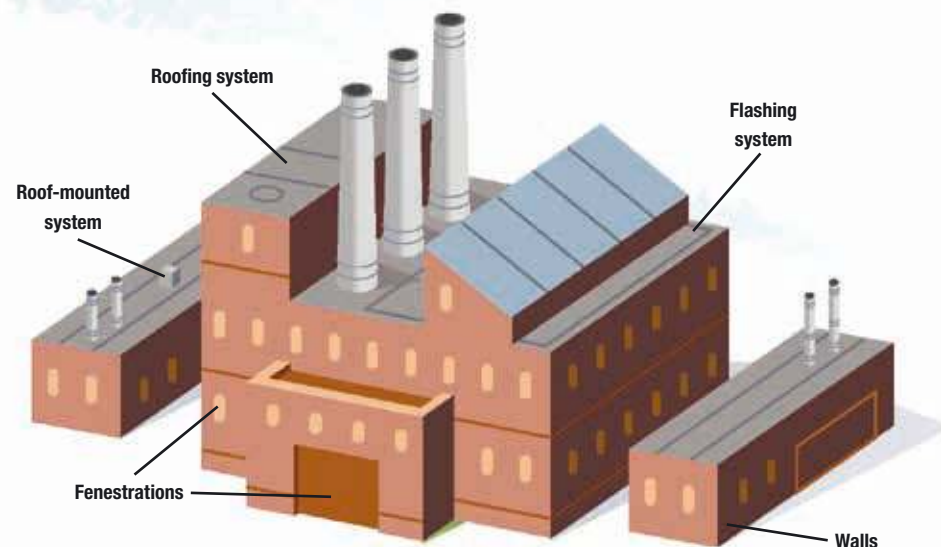
Cooling towers should be tested and certified as a complete system and evaluated for fire risk, as well as static and cyclic air pressures (i.e. wind) and debris impact. Resistance to seismic loads should also be determined.

Photovoltaic (PV) systems are increasingly specified and used on commercial and industrial rooftops due to the need to satisfy the latest energy efficiency and sustainability regulations. PV systems are specialist installations that can adversely affect the fire performance of any given roof assembly. FM Approvals standards can be used to evaluate both rigid PV modules, which typically require a metal rack system for roof mounting and flexible PV modules, which can often be integrated directly with roofing membranes.

Exterior wall assemblies

Exterior wall assemblies are another major element in the building envelope. They must be able to protect a structure from fire and natural hazards associated with the local environment, including rain, hail, high winds and temperature extremes. They are required to limit fire spread from external fire risks (e.g., fire from adjacent buildings or vehicles), from ignition sources within the cavity (e.g., hot work, grinding sparks and electrical shorts) and from internal fire risks (e.g., presence of combustible materials, failure of electrical or mechanical equipment).

Over the past 20 years, intermediate- and small-scale testing has replaced much



▲ **Figure 1:** The “building envelope” on most industrial/commercial buildings is a complex system of components and assemblies that make up the outer shell of the structure and provide the first line of defense against manmade and natural hazards. The building envelope may include not only insulated wall and roof assemblies, but also skylights, solar panels, HVAC systems and other roof mount equipment.

◀ **Figure 2:** When things go wrong. Fire is fast and devastating. Certified building envelope products help to prevent disasters.

of the costly and time-consuming full-scale fire testing previously required for walls and ceiling panels. For instance, full-scale 25 ft. and 50 ft. (7.5 m and 15 m) corner fire tests have been replaced, in most cases, by the small-scale Fire Propagation Apparatus – also known as ISO 12136/ASTM E2058 – and intermediate-scale tests such as the Parallel Panel Test and Room Fire Test.

Fenestrations

The building envelope is only as strong as its weakest link. Windows, doors, skylights, shutters, and impact resistant films – fenestrations – should not be overlooked when designing a building to withstand fire, hurricanes, powerful windstorms, hail and windborne debris. Damage to fenestrations can lead to serious damage to the building contents and the building structure itself.

Skylights, for example, are not only susceptible to damage from the natural hazards noted above, but also to foot traffic. Skylights made from various plastics also pose a fire risk from both internal and external sources. Fire tests should evaluate the ability of the skylight to limit flame spread, and measure the sample’s propensity to melt and drip, which could adversely impact the performance of sprinklers located just below.

Conclusion

The majority of all property loss is preventable when risk engineering best practices are followed. Products that have not been evaluated for loss prevention performance by a reputable testing agency may not provide the long-term loss protection expected or required. Loss prevention engineering and services provide added benefits by helping organizations prevent property losses in the first place. By avoiding losses due to fires, floods, hurricanes and other natural and man-made disasters, companies can significantly impact their business resilience and drive down their overall cost of risk.

➔ **For more information, go to**
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References

www.fmaprovals.com website Provides comprehensive information, including all available to download Approval Standards. www.approvalguide.com, The Approval Guide, a searchable online database of over 70,000 FM Approved products. www.roofnav.com RoofNav, a searchable online web-based roofing design tool for roofing professionals. FM Global Property Loss Prevention Data Sheets www.fmglobal.com/research-and-resources/fm-global-data-sheets.

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Mass notification systems: the basics

Mass notification systems (MNS) have gained popularity among businesses and institutions of all sizes, largely due to the breadth of safety and cost benefits, as well as flexibility and scalability, that they provide. These integrated “mass communications” solutions bring together a number of different components, oftentimes including a traditional fire alarm system, and can be as simple or complex as the environments that require them.



Aaron Saak

Although many business owners, facilities managers and safety directors are clear that an MNS should be an integral part of their plans and operations, with the increase in technological advancements and new code requirements – such as NFPA 72, Chapter 24 – there may be some understandable confusion.

Whether you’re considering implementing an MNS for the first time, or want to ensure that your existing system is up to date, a refresher on the basics of mass notification is a smart move for the overall safety of your building.

▼ **Addressable speakers deliver audio messages to targeted areas within a building.**

Understand The Benefits

An MNS has more functionality than a traditional fire alarm system, as it can be used to notify people not only of a fire emergency, but also to provide other life-safety information during events as well as day-to-day information and updates.

Where a fire alarm system alerts people to vacate a building or take other action in the event of a fire, a MNS provides the means to communicate with all building occupants, or with specifically targeted areas. Additionally, a MNS is able to disseminate non-emergency information and updates like store locations, sales and weather conditions. Using distributed messaging systems, this technology can broadcast alert notifications and evacuation route directions in the event of an emergency.



Aaron Saak is Vice President and General Manager for Tyco SimplexGrinnell.



Image courtesy of Tyco SimplexGrinnell

▲ **Visual displays provide critical communications in areas where personnel is hearing impaired or audibility is difficult.**

For example, in an active shooter situation, leaving the building may in some cases actually put more people in harm’s way. Depending on the situation, it may be safer for occupants to shelter in place or move to a different floor in the building.

The same capability applies to weather-related issues, where a MNS works in tandem with a display board or email notifications to alert people to take shelter in a basement due to a tornado threat. In addition to disseminating emergency messages in a crisis scenario, a MNS can also be used to share relevant day-to-day information. An office facility might have video screens in its elevators, which share weather reports and top news throughout the day. These screens are helpful because they regularly provide convenient information, and can switch over to disseminate warning messages in an emergency situation. Given that staff and employees grow accustomed to looking at these devices, they may be more likely to see a crisis scenario message and follow the direction that’s provided to help protect their safety and well-being.

Consider a Voice-enabled Fire Alarm System

Voice-enabled fire alarm systems can in fact be the cornerstone of an integrated mass notification solution. Voice fire alarm systems have the capability to instantly broadcast live or recorded messages in buildings, institutional and campus environments and other facilities. A universal message, or individual messages tailored to specific areas, buildings, floors or rooms, can be delivered through the fire alarm system.

An advantage to this approach is that it is cost-effective and enables a facility to leverage existing fire and life-safety systems and infrastructure. In addition, the fire alarm system provides code-required emergency back-up capacity to keep the system in operation if the primary source becomes compromised. It also provides a high level of survivability, enabling fire alarm control units connected on a network to continue operating even if a fault or other issue occurs on the system.

Choose Your Method of Communication

While many people associate a text alert with MNS today, a system is usually made up of multiple modes of communication

that can include audio and/or visual notification from a fire alarm system, email notifications, automated phone calls (similar to a reverse 911 call) and visual messaging boards. A MNS can also include something as simple as updating the messaging on TVs or LCD displays in elevators or lobbies, or other devices that building occupants often rely on to provide valuable information.

For larger buildings and campuses, a loud speaker or an outdoor speaker array can sound a siren notification or deliver live or automated messages. A MNS can also be used for paging. There is, however, a provision in NFPA 72: National Fire Alarm and Signaling Code, that requires all paging or non-alarm events to be overridden in the event of a fire alarm activation or when required by the Emergency Response Plan MNS activation.

Know Your Codes: NFPA 72, Chapter 24

NFPA 72, Chapter 24 covers “Emergency Communications Systems,” and allows for different types of alerts during an MNS activity or other event. NFPA 72 not only allows for local customized messaging, but encourages it. As all facilities are unique and situations vary, it’s a great benefit to



▲ Flexible wiring in addressable notification technology lowers cost of installation and ownership.

have customized messaging that meets each facility's needs and individual plans – and that addresses the potential scenarios that may occur.

In addition to customized messaging, NFPA 72 requires voice messages to be intelligible. It's no surprise that if facilities are installing voice enabled fire alarm systems, they are going to expect them to work properly, including being able to understand the directions in case of an emergency. This new requirement in NFPA 72 will certainly be welcomed by all in the industry, and for good reason.

There have been a few major changes to the 2016 edition of NFPA 72, including:

- Intelligibility modifications to ensure both listed and non-listed systems are compliant
- With the new addition of Class "N" for network communications, MNS can now take advantage of IP technology to comply with NFPA 72 while utilizing IP pathways

- New message template information in new Annex G "Guidelines for Emergency Communication Strategies for Buildings and Campuses."
- Listing of equipment for MNS use has been tightened and now requires systems to be listed to one of three standards:
 - ANSI/UL 864, Standard for Control Units and Accessories for Fire Alarm Systems
 - ANSI/UL 2017, Standard for General-Purpose Signaling Devices and Systems
 - ANSI/UL 2572, Mass Notification Systems

Looking Ahead: NFPA 72

As technology continues to advance across the industry, the logical next step is for the code requirements to update to reflect these changes. One example is the increased use of IP technology that is requiring NFPA 72 to monitor and implement changes for the use and application of this technology. As of today, there are already changes underway that modify

how systems transmit their events to supervising stations and how these supervising stations relay information to first responders.

The latest closing date for proposals for the 2019 edition was in June 2016 – it's an exciting time to see where the latest technologies will take NFPA and the fire protection industry as a whole.

The advancements and overall advantages of MNS are a great addition to building environments that value safety above all else. Once building safety managers are aware of the numerous benefits MNS offer – such as the flexibility of both emergency and day-to-day communications, the ability to integrate voice, text messaging, visual displays and more – they are one step closer to protecting the people who matter most. By staying up to speed on the developing technologies and code changes, companies and institutions can help ensure they are getting the most out of these life-saving systems.

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Protecting critical assets at Kuwait University

Despite the effectiveness of halons in suppressing fire, the 1987 Montreal Protocol prompted stringent measures to phase out production and use of halon due to its high ozone depletion potential. Like other countries complying with the Montreal Protocol, Kuwait banned halons consistent with the dates outlined in the treaty, and mandated the replacement of these agents with other fire suppression agents with a stronger environmental profile.

Kuwait University is one of the oldest educational institutions in Kuwait, yet has dynamic plans for development, and keeping its students at the cutting-edge of scientific advances. To replace the existing halon fire suppression systems protecting its critical assets, Kuwait University decided to upgrade to a new, effective, and more sustainable technology, while being 'future proof' against current and future regulations.

Criteria for success

Kuwait University evaluated the various fire suppression systems available in the market. Selection criteria included extinguishing performance, maximum safety to occupants, sustainability and long term assurance about system validity.

▼ Kuwait University College of Science & Faculty Club.



Image courtesy of 3M

The successful agent had to meet the following criteria:

- Space consideration: due to limited space.
- Speed of suppression: the system must control and extinguish the fire as soon as possible to help ensure safety of students.
- Personal safety: Due to the occupied nature of the areas to be protected (areas include a data centre); the agent must provide high safety margin to occupants.
- Asset protection: minimal, if any, collateral damage to sensitive electronics or critical assets if a fire were to occur.
- Ability to maintain continuous operation: no need to 'power down' equipment when the fire suppression system is activated.
- Maintenance concerns: minimising the downtime due to maintenance as much as possible. System complexity, off-site refilling, pressure adjustment due to pressure drop, potential long shipping durations of clean agent, were all among the concerns surrounding the agent and system selection process.
- Reliable support from the contractor to ensure the system functions correctly and to provide immediate service in case of system discharge

The chosen system

After carefully evaluating the available agents in the market, 3M™ Novec™ 1230 Fire Protection Fluid was selected as the agent of choice. Novec 1230 fluid met all the criteria set by the client, including limited footprint requirements, fast discharge within 10 seconds and fire extinguishing within 30 seconds after discharge (as per NFPA 2001 standards). With the highest safety margin to humans as endorsed by the US EPA and best dielectric strength (relative to N2), Novec 1230 fluid is designed to provide protection to humans and equipment alike, while ensuring continuous operation. The 3M™ Blue Sky™ Warranty provided Kuwait University with a 20 year warranty against any future environmental regulations, ensuring long term peace of mind.

The selected system requires simple maintenance procedures and can be refilled onsite if necessary. Due to its non-flammability, non-hazardous nature, and liquid state at ambient conditions, Novec 1230 fluid may be airlifted in case of emergency without the restrictions required for gaseous agents.

A spokesperson from Kuwait University comments:

"We selected Novec 1230 fluid to protect Kuwait University valuable assets because of the unique features and benefits of the agent. The environmental and safety profile, limited space footprint and easy maintenance requirements makes Novec 1230 fluid the ideal agent to use. Kuwait University's vision is to be a national pioneering university with outstanding qualifications in higher education and scientific research. We're confident that through this upgrade we now have a fire suppression system which is similarly 'state of the art' and will provide long term protection of our students and campus. The installation of this fire suppression system has strengthened our belief that we have the best fire safety measures in place".



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Fire alarms and sprinklers: Verifying technical competency

Are you fully satisfied the fire sprinkler or fire alarm test reports you receive are accurate? Are you confident your fire alarm plan reviewers understand the impact adding audible/visual fire alarm notification appliance has on line voltage measurements? Can your fire sprinkler plan reviewers explain how design densities change when commodity classifications vary?



Rob Neale

Rob Neale is Vice President, National Fire Service Activities International Code Council.

If you answered “no” to any of these questions, how confident are you that the sophisticated fire protection systems and equipment in your jurisdiction will operate as intended to protect lives and property?

Building owners go to great expense to install fire protection systems. The costs of design, installation, inspection, testing and maintenance add capital and operating costs to the life cycle of a building. Insurance underwriters include

fire protection systems in their risk analysis when setting premiums.

Regardless of the financial impact, the public and fire fighters rely on these systems to provide early warning and fire control to give them time and conditions to survive.

▼ **A complete fire protection system test includes water flow. The certification process assures the testing team knows how to assess the results.**



Image courtesy of Rob Neale

Verifying Technical Competency

Modern commerce thrives on consumer education and awareness. People who buy products and services want to know they are getting value and quality for their investment. In many cases, this combination of service and skill is regulated by government rules that are intended to protect the public through performance testing and certification to verify that someone is competent to perform the service they offer.

No one questions that we require training and certification for medical personnel. Many states regulate cosmetologists and nail technicians. Even the National Association of Pet Sitters offers a certification program.

But what do we do with the men and women we task with reviewing, approving and inspecting essential life safety and fire protection features as fire alarm and sprinkler systems? To address the gap in assessing technical competence, the International Code Council (ICC) offers five professional certifications for government and industry: commercial fire alarm inspector, commercial fire alarm plans examiner I and II, commercial fire sprinkler plan reviewer and commercial fire sprinkler inspector.

Table 1 provides a sample content breakdown of one of the certification exams. Some of these general categories have two or more subcategories with related content.

The certification exams are based on the International codes and corresponding National Fire Protection Association (NFPA) standards such as



Image courtesy of Rob Neale

NFPA 13 for fire sprinkler systems and NFPA 72 for fire detection and alarm systems. The open-book exams range from 60-75 multiple choice question over two to two-and-one-half hours. The exams may be taken in paper and pencil or online format. Exam fees are \$199. For more information and registration details, visit the ICC national exam and certification site at <http://www.iccsafe.org/education-certification/certifications-and-testing/national-exam-info-registration/>.

Program History

The push for these certifications began about a decade ago when the city of Henderson, Nevada, was evaluating the overall performance of its code

▲ **The commercial fire alarm inspector certification assesses the candidate's knowledge of fire alarm control unit installation and wiring methods.**

enforcement efforts. The building official was able to amend the inspector's and plans examiners' job descriptions to require they obtain certifications in the disciplines in which they were working (e.g. plumbing, mechanical, structural). Subsequent negotiations with employees resulted in agreements that since employment conditions had changed there should be a corresponding change in wages.

Fulton Cochran, assistant fire chief at Clark County Department of Building and Fire Prevention and former deputy fire marshal in Henderson, explained there was a pay disparity of about 8% between the building code plans examiners and those performing fire code plan reviews. To achieve parity, the city insisted the fire plans examiners have an equal number of professional certifications to those performing building plan reviews. At the time, fire-related certifications did not exist and those produced by the National Institute for Certification in Engineering Technology (NICET) were addressed more to the industry side of design and installation rather review and approval.

When Cochran became a member of the ICC Fire Service Membership Council he worked on the Board for International Professional Standards where he realized he was in a position to influence the

Table 1 Commercial fire sprinkler plans examiner sample test content

Topic	Test Weighting (%)
Ability to read plans	9
Use Group/Construction type/Hazard classification	9
Seismic and Freeze Protection	6
Hydraulic Calculations and Water Supply	31
Standpipes	11
Fire pumps	8
Commodities/Storage	8
Fire Department Connection	7
Materials (Pipe/valves/fittings)	11
Total	100



▲ The regular maintenance and inspection requirements for fire pump assemblies – such as this horizontal split case pump – are evaluated in the commercial fire sprinkler inspector certification examination.

◀ The commercial sprinkler plans examiner and inspector exams test one's ability to evaluate sprinkler obstructions and find approved solutions.

development of these new certifications. The ICC conducted a nationwide needs analysis and developed the five certifications and exams based on those results.

Cochran said the certification programs are especially important in those jurisdictions that may not have experienced fire service plan examiners. "If I'm a building official," he said, "I would like to know my plan reviewers have some level of competence and not just looking at the name of a [design or engineering] company and stamping it off."

Although the certification programs have been available for two years, government and industry participation has been disappointing. There are several fundamental challenges to its success, Cochran said. The first is increasing code officials' awareness

of the programs. Second, he said, current job descriptions may not require the certifications. Cochran suggested jurisdictions shouldn't wait for a vacancy to update job descriptions, but should work with staff and collective bargaining organizations to keep them current.

A third way, Cochran said, is in those states where the state fire marshal establishes minimum performance standards the states could leverage the requirements for certifications. "This would be the fastest way to effect change," he said. "If all jurisdictions would move forward into certification requirements, we could tell people 'if you want to have these jobs, you need to have these credentials.'" The fact that we have certifications on the inspection side, he added, provides an avenue for licensing and certification and third party providers.

The future

So what does the future hold for these certifications? How does someone convince an employee who has many years of experience in sprinkler or fire alarm plan review and inspection that he or she needs to be certified? According to Cochran, "the counter back is 'well, how you are going to show me you are in touch with the current standards? Show me you are a 30-year veteran, not a one year veteran who did something 30 times'."

The quickest way to move toward certification, Cochran said, would be to get a state to adopt certification requirements for fire alarm and sprinkler systems into their statewide requirements.

Meanwhile, ICC is moving forward with new marketing efforts to explain the programs' value to government officials and private industry partners. ICC has begun to work with the American Fire Sprinkler Association and the Automatic Fire Alarm Association to gauge their interest in the certification programs. ICC will be reaching out to other trade and governmental organizations over the next few months.

Summary

Professional qualifications for public and private sector personnel engaged in critical fire and life safety system design, plan review and inspection are an important way to assess performance and establish baseline qualifications. Testing and certification assure that minimum qualifications are met, there is consistency in the level of service provided, and the certified person has been assessed at a high level of competence. Isn't that the least we should expect from people in this business?

➔ For more information, go to www.iccsafe.org/education-certification/certifications-and-testing/national-exam-info-registration/

References

1. http://www.petsitters.org/napps_certification.php.
2. These certification exams are open to government and private sector candidates. The description "commercial" is only to distinguish the certifications from "residential" examinations. ICC also offers a residential sprinkler fire inspector/plans examiner certification.

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Fixed gas detection systems assist in emergency response and evacuations

Hazardous materials are substances which can cause death and injury, as well as damage to properties and the environment. There are numerous incidents of hazardous material releases every year. These releases may be airborne, or spills that contaminate water, soil and communities. Airborne hazards affect outdoor areas, but they may also permeate buildings and affect people indoors.



Steve Bonino

Steve Bonino is the Technical Manager at Aerionics, Inc., manufacturers of Macurco gas detection equipment. The Macurco product line features a broad range of fixed and portable gas detection products for fire & security, HVAC and building automation systems, and for personal safety and hazardous environments.

I hazardous material releases lead to evacuations of areas and buildings in a majority of cases, however, depending on the hazard, release pattern, weather, and other factors, it may be advisable to stay indoors or shelter in place. Most incidents result from accidental releases of toxic industrial or agricultural chemicals and happen during regular operations at fixed facilities. Airborne releases draw more attention due to their potential to negatively impact large areas. Dispersion of airborne releases is influenced by the release location, mechanism, chemical properties, weather and geography. Modeling and simulation tools are used to analyze and predict the dispersion of releases using inputs from reports,

observations, monitoring devices and gas detection systems. These tools help determine the dispersion area and associated concentrations. These concentrations are then used to assess the risk to the population, environment and property in the affected areas. Incident management personnel use these types of models and simulations

▼ Oil refineries and chemical plants can produce toxic products such as gasoline, jet fuel, diesel, ethylene, benzene, toluene and xylene. The United States Environmental Protection Agency is aiming to protect the health and safety of fence line neighborhoods by significantly reducing toxic pollution and making emission information quickly available to affected communities.



to predict the impact of releases, allocate resources, plan response operations and determine evacuation routes.

Bhopal, India is well known for what was called the worst industrial accident in history. On December 3, 1984, approximately 45 tons of methyl isocyanate escaped from an insecticide manufacturing plant. The gas drifted over the densely populated communities around the plant, immediately killing thousands of people and creating a panic as thousands of others attempted to evacuate the area. The final death toll was estimated to be up to 20,000 people and an estimated half-million survivors suffered a variety of maladies resulting from exposure to the toxic gas. In June of 2011, at Tyson Foods Inc., in Springdale, Arkansas, chlorine gas was released after the accidental mixing of two chemicals. Sudden exposure to chlorine gas can bring on coughing and choking spasms, severe chest discomfort, vomiting and other symptoms, and in severe cases, the lungs can fill with fluid. The accident resulted in the evacuation of about 300 workers, the exposure of 173 people and 50 people sent to nearby hospitals, including 5 that were treated in intensive care. Evacuations are more common than many people realize. Fires, floods and hurricanes frequently cause evacuations. In addition, hundreds of times a year, transportation and industrial accidents release harmful substances, forcing many people to leave their homes. In some circumstances, local officials decide that the hazards are serious and require mandatory evacuations. When community evacuations become necessary local officials provide information and recommended evacuation routes to the public through the media. In some circumstances, other warning methods, such as sirens, text alerts, emails or telephone calls are used.

In January 2013 it was reported that close to 40,000 pounds of benzene was accidentally released into the atmosphere at the Shell Oil facility in Deer Park, Texas. Inhalation exposure to benzene can cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Long-term exposure can cause disorders in the blood, reproductive effects and increased incidences of leukemia. This Shell Oil refinery produces gasoline,



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jet fuel and diesel and their chemical plant produces products, such as ethylene, benzene, toluene and xylene. In response to the release incident Shell agreed to spend \$115 million (USD) to control harmful air pollution, and paid a \$2.6 million civil penalty. This case is part of a United States Environmental Protection Agency enforcement effort to protect the health and safety of fence line neighborhoods by significantly reducing toxic pollution and making emission information quickly available to affected communities. Shell also agreed to spend \$1 million on a state-of-the-art system to monitor benzene levels at the perimeter of the plant which is located near a residential neighborhood and school.

Health and safety specialists use advanced test equipment and fixed gas detection systems to monitor facilities, areas and fence lines like this, to prevent harm to property and the public, in a variety of applications and environments. Gas detectors are generally available in two different types; portable which are handheld and are used for personal safety, and fixed which are permanently installed in and around a given facility. Portable gas detectors are also classified as "personal safety instruments" as they ensure detection of toxic and flammable gas hazards in the immediate vicinity of the wearer or user. Fixed gas detection systems are installed in oil and gas refineries, chemical plants, waste-water

▲ Modeling and simulation tools are used to analyze and predict the dispersion of releases using inputs from reports, observations, monitoring devices and gas detection systems. Incident management personnel use these types of models and simulations to predict the impact of releases, allocate resources, plan response operations and determine evacuation routes.

treatment facilities, steel mills and similar applications. There are many fixed gas detection technologies available to help provide measurement, protection and communications for flammable, toxic and oxygen gases. Many of these instruments are "intrinsically safe"; or incapable of igniting an explosive atmosphere by either spark or heat. This equipment is used by operators and health and safety specialists to maintain safety during operations, to report the presence of gases and to activate alarms or associated equipment.

Strict government regulations and growing demand for safety measures are driving forces for the development of sophisticated tools and complex networks to control emergency situations. Technologies like "smart buildings" are being launched in the fire and security systems market. Intelligent detection systems and wireless mesh networks consist of spatially distributed independent gas detectors that monitor air quality conditions and cooperatively



Image courtesy of Dansk Redningshænder og Beredskaber via Foter.com / CC BY

▲ Industrial accidents can release hazardous substances which force workers to leave their jobs and people to leave their homes due to mandatory evacuations. Real-time information from round-the-clock monitoring and fixed gas detection can improve situational awareness and facilitate quick decisions regarding command posts locations, road closings, and evacuation routes or shelter-in-place responses.

pass their data through the network to a main location. Remote users can also access these intelligent fixed gas detection systems by connecting through building automation systems and computer networks. These commercial building automation systems (BAS) collect vast amounts of data through the sensory network and employ computing and digital communications tools. This data can be used to maintain a building's climate, energy efficiency and lighting, and also to ensure the security and safety of a building. Other software products include advanced process controls and manufacturing execution systems. These systems help in identifying and collecting data regarding any changes or problems in a facility or production process. Related emergency response components of a BAS include public-alert, voice evacuation, emergency lighting and secure communication.

Building automation systems can improve the strategic decisions made by hazardous material response teams. Public safety agencies deploy resources and solutions to protect the public and property, and to limit the effects of release of hazardous material catastrophes. The challenges faced by first responders managing hazardous material releases are numerous. Communication networks can provide critical and accurate information for police and fire departments regarding a crisis and enhance the response time. Immediately upon learning of an emission first responders need to know when the material was released, what material has been released, how that material reacts upon release, and how weather conditions will impact the release. All of these factors will play a part in the plan first responders implement to protect the response team, the facility and the surrounding community. Facility building automation systems, sensory input and software solutions can enhance the tactical decision-making abilities of chemical emergency response teams. These systems help to make good response decisions before, during and after an incident. By using available meteorological and fixed gas detection system data, dispersion modeling tools can provide real-time status reports as well as project future developments.

A number of dispersion modeling tools exist across federal agencies, universities and commercial companies. New technologies, software, years of data and analysis have facilitated the development of modeling programs that address chemical release, evaporation, building infiltration and dispersion. Release rate illustrations from plume modeling and plume measurement are used to produce clear out computer imagery for incident commanders. Gas dispersion models estimate pollutant concentrations downwind from an accidental chemical release where the dispersing substance is heavier than, equal to or lighter than air. These models account for point sources and release durations, either finite or continuous, and estimate concentrations downwind from accidental chemical release. Also critical in addressing an incident is acquiring weather data and weather reports uploaded in real-time from the internet or local weather station. Mapping software and global positioning technology, used with facility monitoring and gas detection data, aids in determining emissions, source locations and movements in and around a facility.

Industrial accidents can release hazardous substances which force workers to leave their jobs and people to leave their homes due to mandatory evacuations. Real-time information from round-the-clock monitoring and fixed gas detection can improve situational awareness and facilitate quick decisions regarding command posts locations, road closings, and evacuation routes or shelter-in-place responses. When community evacuations become necessary local agencies provide information and recommended evacuation routes to the public through the media or other warning methods. Rapid, well informed assessments can save lives and better protect surrounding community by enabling more timely and effective response to emergencies. These systems provide compliance with local and federal regulations, and greater awareness and preparedness in advance of a potential incident. After the incident the response measures can be effectively investigated, validated and defended with detection, monitoring and modeling data.

➔ For more information, go to www.aerionics.info

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The role of the passive fire protection installer

A well designed passive fire protection (PFP) strategy and specification are not the only considerations in adequately protecting built assets from fire. Of equal importance is the workmanship of installers and, thereafter, the maintenance team.



Ross Newman

PFP is built into the fabric of an asset or building in the form of walls, floors, ceilings, beams, columns, screens, seals, fire-stops, doors and shutters. It performs two essential functions in the event of a fire:

- 1 It allows the asset to remain stable for a specified period to allow people time to escape and fire fighters to attend, for example.
- 2 It resists the spread of fire and smoke between assets, or between subdivisions within a single asset, helping to protect people or valuable contents in a building, for example.

PFP strategies comprise disparate elements that together make a critical system. Installing a single one of these elements without an understanding of the overall critical system can lead to integration errors, even when that element is correctly installed.

The impact of fire and smoke has the potential to be extremely grave. It can kill and severely injure. It will also destroy or write off fixtures, furnishings and equipment and fatally weaken the structural integrity of assets.

In an industrial setting, this sets up a domino effect of negative impacts, interrupting business and leading to delay, financial losses, lawsuits, redundancies and even insolvency or bankruptcy. Although the risk cannot be eliminated altogether, the impact is so detrimental to operations as to demand efforts to minimise it.

Fires and smoke are dangerous but they usually become catastrophic when they spread from the room of origin. The point of PFP is to prevent this spread or, at the very least, delay it. All too often, however, fires do spread, often because of faults with the installation.

Certain elements of PFP construction such as masonry walls or timber or steel structures are likely to remain untouched throughout the life of the structure. They need no maintenance and little vigilance from the point of view of fire safety.

Therefore, the main risks arise if they are not installed correctly in the first instance.

However, other elements of construction, such as doors and partition walls, suffer from wear and tear or are more likely to be altered and are, accordingly, a higher risk factor. Those that are subjected to daily use, such as doors, shutters and so on, will need to have their fire safety role preserved through a programme of maintenance. Equally, elements that are likely to be altered or penetrated (to allow building services to pass through, for example) will suffer damage and require repair. The new penetrating element will need effective fire-stopping. Both need to be properly installed at the start of their life, and the people who work on them subsequently need to be competent.

Since many PFP solutions are effectively hidden in the final building, they are difficult to put right. More importantly, they are very difficult to verify or detect by cursory inspection, even if the offending structure is visible. It takes skill, experience and competence to accurately identify the fire rating of an element, especially in the absence of any historic documentation.

Retrospective fixing is, of course, unavoidable in some circumstances, especially where a building undergoes a change of use or working practices are introduced that change the existing fire risks. In instances like this, maintenance work is likely to be carried out years later and left to less well qualified facilities management staff than during an initial build, where highly qualified fire installers with a fresh understanding of the fire strategy may be on hand.

Ross Newman,
Principal Technical
Officer, Exova BM TRADA.

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Minimum life-safety aspects of PFP are often enshrined in legislation and regulated both when the asset is built and after it is in use. However, owners, insurers and other interested parties will often go further than this minimum if the risks warrant it.

Part of the solution to good installation is to get the specification right in the first instance. A comprehensive specification, clearly defined and accompanied by accurate, comparable drawings, goes a long way to mitigating the risk of misunderstanding. Wherever possible, only adequately quality-assured and tested products should be specified. The overall strategy needs to be effectively communicated, with the integration issues clearly expressed. In this respect, working in a contractual BIM environment helps.

Even after handing over comprehensive specification information and clearly communicating the strategy, success still lies in the hands of the installer.

Double-checking every aspect of every element of a PFP build is one way to check the quality of what they do. However, doing so is likely to be deeply inefficient and unrealistic, especially during the initial build. A more practical precaution might be to double-check a representative sample of typical PFP constructions.

It is likely that you will want evidence that the installer is adequately qualified before they come on site. Indeed, insurers and fire consultants are increasingly insisting on third-party certified services for peace of mind.

It is not enough to rely solely on the installer's authorisation. Instead, check that they have relevant recent experience, and that they can back up their claims with certificates of competence.

The things to look for are not just the existence of a certificate, but a relevant, up-to-date certificate from a recognised organisation. Given the fire risks associated with PFP installation and its systemic complexity, careful scrutiny of any documentation is critical. The certificate must be relevant to your type of installation, in date, and from a properly accredited third-party organisation.

Fortunately, there are a number of highly reputable third-party certification schemes for installation and maintenance providers. Successful candidates will typically only be awarded their certificate if they have attended a training course,



Image courtesy of Exova

passed an examination, and had their work scrutinised by an independent third party.

This gives the highest possible level of confidence that the work will be carried out correctly. Insisting on certificates of this kind will also demonstrate due diligence in the unfortunate event of a fire. Dealing with the damaging effects of fire is bad enough without the additional burden of being the subject of a legal claim.

While the fixed structural elements of PFP are of course critically important, they are rarely subject to change during the life of a building. We have established that partition walls and doors are much more prone to be altered or suffer damage through wear and tear than fixed structural elements of PFP, so it is especially important that the people who install or maintain them understand what they are doing.

The fundamental objective is to preserve the element's confirmed fire rating. Small repairs to the beading around the glazing in a fire door can have catastrophic effects on the fire rating, for example, and so it is critical that the installer must appreciate what can and cannot be done.

▲ An example of a plugging system utilised by a third party certification provider for fire doors, denoting the door leaf and complete doorset has been manufactured by a third party certified company (red and silver plugs) and the doorset installed by a third party certified installer (gold plug).

Work to maintain a fire rating is difficult, particularly on fire doors or when building services penetrate a fire barrier. However, when it is also accompanied by a change of use that increases or merely changes the fire risks in the building, more sophisticated knowledge is needed. Of course, this is where the right certificate attesting relevant competence is especially valuable.

There is no question that employing third-party certified installers are worth the extra cost for the fire risks they mitigate. Furthermore, installing and maintaining PFP elements correctly extends their service life. More to the point, retrospective fixes for poorly installed designs are disproportionately difficult and expensive, adding extra motivation to get it right first time round.

For more information, go to www.exovabmtrada.com/en-gb



New FyreWrap® DPS Insulation for clothes dryer vents.

Recent FEMA statistics indicate significant injuries, loss of life and property damage due to clothes dryer fires in residential buildings. At the same time, code requirements for clothes dryer ventilation ducts in multi-family residences have been difficult to achieve in real-world conditions – until now.

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Fire engineering vs. prescribed fire protection

The title seems to suggest that there are two ways to deal with fire safety on projects, a Fire Engineering approach or a Prescriptive approach. Before exploring that any further there is a need to understand how the two concepts are used and when, and maybe there are other problems related to these two approaches as well.



Jimmy Jönsson

Jimmy Jönsson is a Director with JVVA Fire & Risk in Madrid. He has worked on a wide range of fire/life safety projects internationally over the last 15 years and has extensive experience in developing performance based fire engineering design and analysis. Jimmy has specific knowledge and experience regarding Fire Engineering, Performance Based Design and Risk Management. He has led fire engineering design and implementation across a varied range of international building and infrastructure projects.

Prescribed fire protection, or a prescriptive approach, is a design approach that will allow the building to meet a pre-set standard when it comes to fire safety. Applying already deemed to satisfy solutions to the design the building will inherently be “safe”, it is a “code compliant” building. So from a societal point of view a building that is designed in accordance with the code is considered to be an acceptable building from a fire risk perspective. It is relatively easy to use a prescriptive approach, the code contains the prescriptive requirements and it is a matter of incorporating those into the building design. There is not really any need to understand specific fire engineering concepts (smoke control design, evacuation analysis, etc.) to be able to

apply the prescriptive requirements, it is a matter of correctly interpret the code. So why not always use such an approach? A prescriptive approach is limited in such a way that when a building, its architectural design (the vision of the architect), deviates too much from a “standard” building it is very difficult to impossible to apply the standard set of rules set out in the code. This of course does not necessarily mean that the building is unsafe it just mean that it cannot comply with the deemed to satisfy solutions. This is where Fire Engineering, rightly or wrongly, comes in as a “savior”.

Fire Engineering, or a Performance Based Design approach, works with objectives (safety goals) instead of pre-set rules. It is necessary to show that a certain deviation (non-compliance) from the code is acceptable i.e. that the “performance” of the proposed design solution is as safe as a code solution would have been. Fire engineering is normally only applied to specific areas where the deviation from

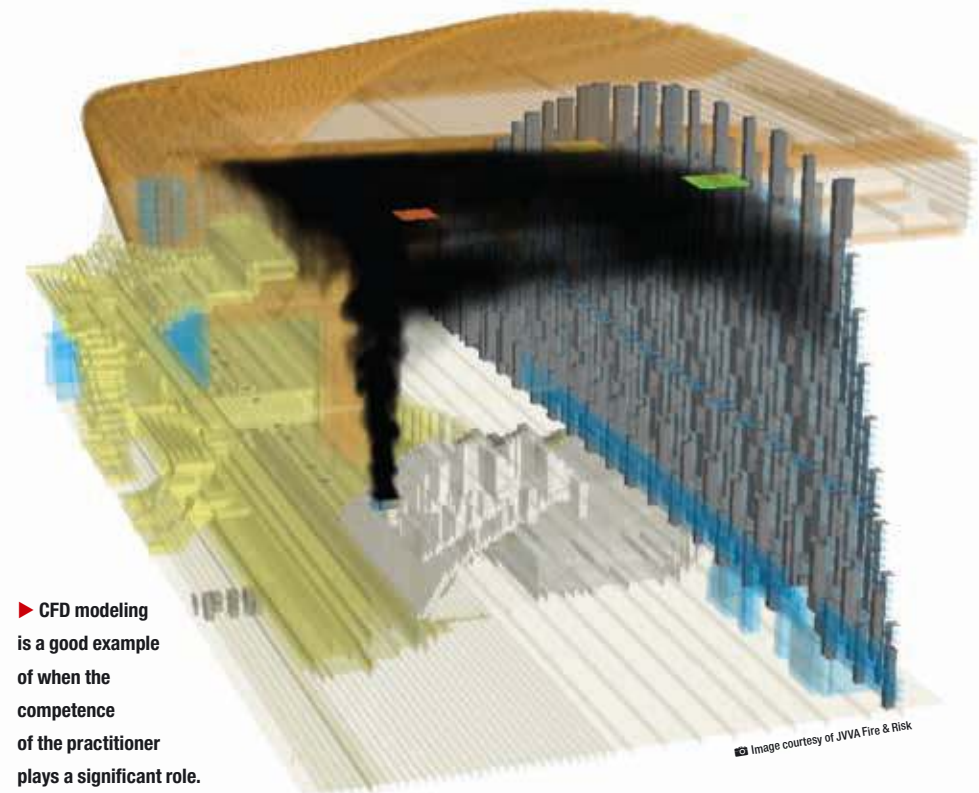
▼ Airport terminals are typical places where a Performance Based Design Approach is necessary.



the code is necessary for the project, the overall design approach is normally a mixture of fire engineering and prescribed fire protection. A good example is an airport terminal, a terminal is normally a large open space with a high amount of occupants. A prescriptive approach could have difficulties to show compliance with for example; size/volume requirements for the fire sector, travel distance requirements, exit width requirements, structural requirements for the roof (non-protected steel), etc. A performance based design is an engineering approach to fire protection design [1], it can be said to comprise of three steps: 1/ agree on and set up the safety goals and objectives to be used (for example, the occupants must be able to evacuate the building safely in case of a fire, the structure of the building must be able to withstand the effects of a fire during a certain time, etc.), 2/ to perform an engineering analysis of the problem (deterministic or probabilistic analysis of fire scenarios), 3/ quantitative assessment of the design against the fire safety goals and objectives using accepted engineering tools, methodologies and performance criteria.

Hopefully the reader should now have a more or less clear idea of these two concepts and when they are used. Besides the obvious differences between the two approaches there is one major difference that cannot (or at least should not) be overlooked, namely the competence of the practitioner. To adequately be able to perform fire engineering there is a definitive need to have a fundamental understanding of the principles used and the specific skills-set needed to develop performance based designs. This is not the case when applying a prescriptive approach.

The competence level of the practitioner is the single most important issue when it comes to fire engineering. Within the fire safety engineering profession this is something that has been looked upon with concern and it is something that are now being recognized as a real problem, and different initiatives [2] are being undertaken to raise the awareness level regarding this problem. Currently, in most countries, there is a confusion regarding the needed qualifications, training requirements and experience needed to be able to practice as a fire engineer (i.e. to adequately perform fire engineering on projects). At the moment there is basically nothing implemented



► CFD modeling is a good example of when the competence of the practitioner plays a significant role.

within the national legal systems to impede an engineer (or a non-engineer for that matter) to call himself a fire engineer and to perform fire engineering on projects. This is directly linked with poor individual awareness of competence, people tend to hold overly favorable views of their abilities and that as a consequence not only do they reach erroneous conclusions and make unfortunate choices, but their lack of competence robs them of the ability to recognize it [3] [2]. The more worrying part of this very real problem is that this could potentially lead to unsafe buildings.

This has now led to that specific countries are to some degree turning their backs on fire engineering by imposing certain design restrictions (for example, specific fire scenarios, specific design fires, etc.) and by that turning fire engineering into “prescribed fire engineering”. This is very clear in New Zealand where regulators now have introduced “prescribed fire engineering”, and other countries seem to be going in the same direction.

The actual key to solve this seem to be quite straightforward but how to implement it in practice is unfortunately not as clear. Fire safety engineering must evolve in the right direction and with some fundamental changes taking place: 1/ this evolution must start with the educational systems providing the market with engineers. We must have educational programs (teaching faculties) which have the necessary

characteristics to produce very competent engineers with the right skills set, see also [4] [5] [6]. 2/ strong competency awareness must be encouraged and fostered within the fire safety engineering profession and the educational systems, see also [3] [2].

So by going back to the title again, Fire Engineering vs. Prescribed Fire Protection, it seems like there is a clear picture of how and when to use these two fire safety concepts. Unfortunately there are greater concerns affecting the actual foundations of fire engineering and how fire safety engineering as a profession and a discipline will evolve.

► For more information, go to www.jvvafire.com

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